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AN ESSAY ON SASSAFRAS OFFICINALE.\*

BY WILLIAM PROCTER, JR.

The Sassafras is in many respects one of the most interesting of American trees, but has attained its reputation rather from the medicinal qualities of its bark and roots, than from the stateliness of its proportions or the excellence of its timber.

Sassafras was discovered by the Spaniards early in the sixteenth century; Hernandes, in his account of the plants of New Mexico, describes it as occurring in the Province of Mechoacan, as early as 1538. The followers of De Soto also discovered it in Florida about the latter period; they called it cinnamon wood, from its odor, and hoped it would prove as valuable as the spice of Ceylon.

Sassafras was also described at an early period by the Jesuits and others in Canada, and by them introduced into France, and soon became generally known in Europe for its sudorific and alterative properties.

Sassafras is one of the most widely distributed trees of North America, being found in Canada, in all the United States east of the prairies beyond the Mississippi, and in Mexico. In the north beyond 42d degree of latitude near the Atlantic, it is only a shrub in size, but it exists as a tree in upper Canada 20 to 30 feet high. In the Middle States it attains, in favorable positions in good soil, a height of 30 to 40 feet, and a diameter of from 12 to 18 and even 24 inches, but such trees are now rare. Further south, especially in Virginia and Carolina, it attains a greater

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height and size. When it occurs in dense woods it often attains a great height, with a thin, almost vine-like trunk, owing to the strong necessity of light to the health of the foliage. When standing separately, in good soil, sassafras assumes a beautiful symmetrical form, being round headed, the foliage being almost wholly on the extremities of the branches or branchlets, which are exceedingly contorted, but radiating in all directions, and, where visible, contrasting their grayish-brown color with the rich foliage.

Sassafras was separated from *Laurus*, by *Nees v. Esenbeck*, and placed in a new genus, *Sassafras*. It belongs to the natural order *Lauraceæ*; it is diœcious, only the female flowering trees bearing fruit. The flowers appear early in May in Latitude 40° N., but much earlier at the south, and are one of the harbingers of spring. They are somewhat aromatic, and by some esteemed medicinal, have a greenish-yellow color, bloom in short racemes, several of which issue from the end of each flowering branch, around the leaf bud, and belong to *Enneandria monogynia* of the sexual system. The fruit is a drupe about the size of a pea, oval in shape, deep blue when mature, and supported on a red, cup-shaped pedicel that attains its color while the drupe is yet green. The drupe contains an acrid balsamic juice whilst in its immature state.

The leaves are the most beautiful feature of this tree, being deep rich green above and paler beneath, with well-marked prominent veins, three of which radiate from the petiole and form the central ribs of the trilobate leaves. On the old trees the leaves are darker than on young plants, and are more savory of sassafras, but less mucilaginous when chewed. They vary much in shape, the lobed full grown leaves being five to six and a half inches long by four inches wide. Some of the leaves are ovate lanceolate, at other times the terminal and only one lateral lobe are developed, and these various forms are nearly always found together in each terminal group of leaves. They are frequently attacked by insects, and at such points become reddish-brown or rust-colored. The young branches near the leaves have a greenish-brown color, whilst the new shoots are green, without any brown coloring matter. Branches from half an inch and upwards in diameter have a thin gray rugged epidermis, often spotted

with lichens, but immediately below this the reddish-brown color of the bark is apparent. The inner layers of the old bark are much lighter in color, whilst the new bark in contact with the alburnum is nearly white. On old trees the bark of the trunk is deeply corrugated and furrowed. Michaux says the color of the old bark is very much like that of cinchona, which is true of the red cinchona. The *wood* of sassafras is coarse grained, and when young is nearly white, but the heart wood of old trees has a reddish cast due to the deposition of more or less sassafrid in its cells. The root wood is nearly white in roots of four inches in diameter, easily split and in distinct annular rings. The live bark immediately in contact with the wood is nearly white or cream colored, fleshy and perfectly free from a trace of brown; it is nevertheless highly astringent and pungent to the taste. When, however, the air acts upon it but for a short time it rapidly colors reddish brown, and eventually assumes the hue of cinchona, a change due to the oxidation of its tannic acid.

The *wood* of sassafras when well seasoned possesses considerable ability to resist decay, due no doubt partly to the presence of a little volatile oil. It is used for posts and stakes, and the larger timber has occasionally been made into furniture; veneers of the knotty curled wood were some years ago much esteemed for fancy cabinet work. When the white young wood is dried with the sap in it, the exposed surfaces acquire a reddish tint. The heart wood is considerably darker than the alburnum, and it is said that a variety exists with the heart wood of a red color, but I am inclined to think this statement applies to the heart wood of the roots of trees cut for some years.

The *bark* of the trunk of sassafras is but slightly impregnated with volatile oil, which resides chiefly in the inner bark of the root along with much tannic acid; and this inner bark is the true medicinal part of the plant, although the United States Pharmacopœia simply directs the bark of the root. The British Pharmacopœia and other European authorities recognize the whole roots, bark and wood together.

The *pith* of the young succulent shoots is recognized in the official list of the United States Pharmacopœia, under the name "Medulla Sassafras." The uses of this portion are solely as a

demulcent. It should be collected in September or before the 15th of October, after which period it is not so well stored with mucilage, and is more apt to become discolored on drying than when extracted earlier. The mucilage of this pith is remarkably pure and free from irritating qualities and admirably adapted for collyria—taking the place of the quince mucilage of European practice. The fresh young leaves give out an abundance of mucilage to cold water, which, though not so pure as that from the pith, may be used for allaying the irritation of inflamed surfaces, in eczema, rhus poison, etc.

The proper period for gathering the bark is in the autumn after the fall of the leaves, until the spring before the sap rises. The volatile oil then appears to be concentrated in the radical part of the tree.

In the State of New Jersey, the usual position to find sassafras trees is in fence rows, and along the edge of wood lands, where the plants originate from seed dropped by the birds; but every neglected spot soon becomes planted with sassafras by the same cause, if the soil is not too closely covered with sod.

The commerce in sassafras involves more labor and capital in that part which relates to the production of the volatile oil, than in that of the bark and roots, and it is only where the tree occurs abundantly that the oil is sought. So far as I have been able to learn, the largest amount of oil is distilled within sixty miles of Baltimore, which is the principal depot for its commerce. Alpheus P. Sharp, of that city, (see Proc. Am. Pharm. Assoc., 1862,) estimated the quantity produced for several years prior to that date at from 15,000 to 20,000 pounds, a figure much reduced by the war. Considerable quantities are extracted in York and Lancaster Counties, in Pennsylvania, and probably much of this makes its way to Baltimore. In some parts of West New Jersey isolated distillers, some of whom are colored men, prosecute a small business in this line. Through the aid of my kind friend Charles A. Heinitsh, of Lancaster, Pa., the following facts were obtained relative to the manufacture of the oil in that county, from Mr. Abraham Murray and Mr. Peter W. Hart, who are engaged in the business. The first point to attain is the material. This consists of the roots of sassafras, large and



small, the other parts of the tree never being used, and, in fact, contain too little oil to pay for the labor of treatment. Persons owning lands with a sassafras wilderness (as it is called) upon them have the trees removed for firewood or timber, and allow the sassafras oil makers to have the stumps and roots without charge, as their removal is payment enough. The contract is cheerfully accepted by the distiller, who, for the mere expense of extracting the roots, provides his material. The labor required varies with the kind of soil and the lateness of the season, greatly increasing when frost or dry weather stiffens the soil. It is a well-ascertained fact that roots from the richest soils produce the most oil and the best bark. Mr. Murray says there are three kinds of oil—colorless, yellow and red—and that the red oil is produced from a different sort of sassafras from the yellow and white; further, that the red oil is always *yielded in larger quantity*, the yellow next, and the white least.

Another manufacturer of the oil, Peter W. Hart, of York Furnace, York County, Pa., writes as follows:—"I have distilled, this summer, nothing but white and yellow roots, making clear oil, using an iron boiler and lead worm; I have distilled the *red root* with copper boiler and copper worm, and the oil I made was red, and the yield no better than from the white and yellow roots, which averages about four pounds to ten bushels of chips. I distil the roots with the bark on, *but don't consider there is any oil in the bark; it is only in the wood*; [!] the amount of time required to distil ten bushels of chips is from 12 to 14 hours. I cannot say how much water is distilled in the operation, and is not used over again. As to the color of the roots, I don't think there is any difference. I consider the best is one that is brittle, easily cut or split; though I consider the root don't yield as well from the 1st of May to the 1st of October. *I prefer the stump [roots] that has been cut from three to five years or longer.*"

In a subsequent letter Mr. Hart reiterates that brittle roots yield more oil than tough, fibrous ones. In reference to the "red roots," he says there is a variety of sassafras which has a *red heart* similar to the red cedar, which, he supposes, will yield

red oil. It yields very abundantly, but not more than brittle roots of a yellow color.

Nevertheless, Mr. Hart, who distils all kinds of roots, gets only clear oil, which he attributes to using a lead worm, and not a copper one.

He further states that the woody part of the stump above ground, and the roots that become uncovered by soil, produce an oil of less specific gravity than the deeper roots, and that it generally passes off with the water.

I have not been able to get at the true meaning of these statements, owing to want of time to make further inquiry for explanation, but suppose that the red oil is produced from roots of old stumps yet containing the bark, whilst the white comes from the young woody parts alone, and the yellow from older recent roots. The sassafrid or red coloring matter of the bark does not communicate any color to the oil, even at the boiling temperature. Mr. J. J. Thomsen, of Baltimore, (see his Report on the Drug Market, Proceed. A. P. Assoc., 1864, page 202), alluding to this variation in the color of the oil, says:—"The color of the oil grades from white (colorless) to red; but this peculiarity does not affect the quality. The distillers say the color arises from two kinds of roots used in distilling, and that the color of the oil varies with the proportion used. They make no effort to separate the varieties, as the quantity of yield is *about the same*." I cannot reconcile these statements, and leave the question involved for future inquiry; repeating, however, that I believe the red roots are from old stumps, as I have seen roots several years old that were strongly odorous of sassafras, and of a deep red color.

Having obtained the roots and transported them to the place of manufacture, those intended to be barked are scraped with any dull instrument to remove the dead, spongy epidermis, which is darker-colored than the underlayers, and contains much grit even after washing. The true bark is then removed in short shavings with a drawing knife, avoiding, as much as possible, the removal of any of the woody portion. The care with which this simple operation is executed materially affects the commercial value of the bark. Mr. Thomsen says that of 30,000 pounds

of sassafras bark received in Baltimore in 1863, only 1000 pounds was of prime quality, the wholesale price varying from 9 to 15 and even 20 cents per pound for superior lots. When taken from vigorous roots, the bark is thick and succulent, and if dried in the shade without exposure to wet and damp it assumes a bright cinchona color, and its flavor is pungent and aromatic.

The woody portions of the barked roots, and those roots not thus treated, are now cut up into chips for distillation. The small distillers of New Jersey generally use old copper stills and direct heat, hence it is not unusual to notice such oil having an empyreumatic taint. Mr. Murray describes the following arrangement as that employed by him and others, which consists of a boiler, a large cylindrical wooden still tank, and a tub and worm refrigeratory. The boiler in his case is an old still, but any steam generator will answer. The tank is of a size suited to hold eleven bushels of chips above the diaphragm near the bottom. The steam enters below the diaphragm, and, rising through the chips, raises the temperature to  $212^{\circ}$ , after which it carries over the oil gradually into the worm, and is condensed. We understand from Mr. Hart that the distilled water is not used to supply the boiler, but presume that some gain would come from using it. A charge of eleven bushels of chips yields from one to five pounds of oil, according to the quality of the roots, or, in fact, according to the amount of bark on them.

*Lignum Sassafras*.—It has already been stated that roots of sassafras are the parts used on the continent of Europe, and in Guibourt, Lemery, Morelot and other French authors, reference is made to the wood as obtained from America. Pereira says, (Mat. Med., vol. ii. 406,) "*Sassafras wood (Lignum radices sassafras vel ligum sassafras)* occurs in the form of large stems or branches, frequently more or less covered with the bark. The wood is soft or spongy, light, of a grayish-reddish tint, and has a fragrant aromatic odor. It is usually sold cut up into chips—*sassafras chips*." Christison says, (Disp. Amer. Edit., p. 847,) "The parts used in medicine are the root, wood and flowers; but at present the bark and wood of the root constitute the only officinal parts employed in this country [Great Britain]. The root is imported in branchy pieces, the crown of which some-

times measures eight inches in diameter, and the bark is often partially stripped off." "The wood is dirty grayish-yellow, light, porous, and it possesses the same odor and taste as the bark, but more feebly."

With these preliminary statements in view, diligent inquiry was made in Philadelphia in regard to the commerce of sassafras root wood, and I could find no traces of it among our druggists, nor had they any knowledge of the root wood being exported. Knowing Baltimore to be a mart for the bark and oil, I applied to Mr. J. J. Thomsen, Druggist, of that city, who kindly took some pains to get at the truth, which he gives as follows:—"Sassafras-root is brought to Baltimore from within a circuit of three hundred miles, of which Baltimore is the centre. The root is the only part used, and any portion of the tree below the soil is esteemed merchantable. The roots are extracted from the ground by the use of levers, and, as obtained in this manner, are brought to market with the wood and bark untouched, and portions of the soil clinging to them. If exposed long to the sun and rain, much of this impurity is washed from the roots, and in this respect the roots vary in value. The branch roots vary from half an inch to six inches in diameter, emanating from a crown or stump varying from ten to fifteen inches, and sometimes, though rarely, as much as two feet in diameter. It is not customary among the collectors to keep them protected from the weather, or to wash them. When purchased in this form by the shippers, the roots are generally placed under cover, where they lose very much in weight by drying. They are then cut into pieces as straight as possible, and formed so as to fill in between barrels, casks and hogsheads when shipped to Europe.

"One or two parcels have been cut up, similarly to dye woods, before exportation, but it did not prove profitable, and is discontinued. Sassafras bark is not exported from here to foreign parts, but is sent largely to New York and the Western States."

It is quite possible that some roots may enter foreign commerce *via* New York, but we have no knowledge of it. It is curious that this contribution to foreign commerce should have been so long unnoticed by American writers on *Materia Medica*.

## CHEMICAL HISTORY OF SASSAFRAS.

The *leaves* contain, principally, mucilage, green coloring matter, tannic acid and ligneous matter. By maceration in water this liquid becomes thick and ropy in consistence. The solution is precipitated by subacetate of lead, but not by alcohol, which mixes with it, forming a transparent mixture of syrupy consistence, a quality noticed in the mucilage of the pith.

The fruit in its ripe state has not been examined, because it has not been obtainable since being engaged with the subject. In its green state the drupe causes an acrid (almost caustic) impression in the throat when chewed and swallowed. It has not the odor of the bark, though somewhat aromatic. Macerated in alcohol after bruising it, a greenish-brown tincture is obtained. When this is evaporated spontaneously until most of the alcohol is dissipated, an oily or oleo-resinous substance separates in globules, which appears to be connected with the acrimony, but was not investigated for want of time.

*The Bark of the Root.*—The best published essay on the chemistry of sassafras bark is that of Dr. H. Reinsh, (Buch. Rep., 1846). In 1000 parts of the bark he found 90 of water; 8 of light and heavy volatile oil and camphoraceous matter; 8 of tallow-like matter; 50 of balsamic resin and wax; 92 of sassafrid; 58 of tannic acid; 68 of sassafrid tannin and gum; 6 of albumen; 30 of gum red coloring matter and salts; 289 of starch tannin, as taken up by potash solution; and 247 of woody fibre.

M. Reinsh found the light oil to pass first, and then the heavy. The former he thought to be most fragrant of sassafras.

The *sassafrid* is analogous to cinchonic red. It separates from the alcoholic tincture when it is poured into an excess of water, as a cinchona-colored precipitate which dries in a granular form like indigo. It has no odor, scarcely any taste, yields oxalic acid and other products by the action of  $\text{NO}^5$ , is very slightly soluble in cold water, more so if tannin is present, but readily soluble in boiling water. Ether dissolves it but slightly; the alkaline solutions dissolve it very freely, and form dark red brown liquids; the alkaline earths precipitate it in combination.



It is evidently a derivative of the tannic acid of the bark, and exists most largely in the exterior layers of the bark which have nearly lost their astringency.

The large proportion found by Reinsh proves that he not only analyzed dry old bark, but probably also that with the epidermis included. I have before alluded to the fact that the growing bark is nearly white; whilst the same bark, simply dried, becomes cinchona-colored exteriorly, and this change slowly extends through it. The following experiments were made:— A root of sassafras, four inches in diameter, was uncovered from soil. Four vials, one filled with pure glycerin, another with alcohol, a third with colorless fixed oil, and a fourth with water, were provided. The epidermis was quickly scraped off, and strips of the bark rapidly removed and introduced into the vials, so as to be completely covered with the several liquids, and before any change of color by atmospheric action had occurred. On standing a few days the alcohol had acquired quite a reddish color, which increased considerably with time. The glycerin was affected much more slowly, but gradually it was discolored throughout, extracting the tannin from the bark, and this in turn being discolored by the air acting on the surface. The bark in fixed oil was a long time intact, but at present it exhibits portions colored brown. The watery liquid rapidly colored, though not quite so soon as the alcoholic. Nitric acid applied to the fresh bark makes a brown spot, and liquor potassæ a dark brown one. Either of the solutions above noticed, except the oily one, are colored deep red brown by potassa. The solutions precipitate gelatin and tartar emetic, and are colored dark blackish-green by sesqui-chloride of iron. The alkaline solution, though dark-colored, affords but little precipitate with hydrochloric acid. It must be apparent from these results that sassafrid is, like cinchonic red, a derivative of tannic acid, and that sassafras tannin exists to a much greater extent in the fresh bark than in the dried commercial specimens. It must also be apparent that carefully-dried sassafras bark is no mean astringent with its 6 per cent. of tannin and 9 per cent. of sassafrid, and might be found useful in some forms of diarrhoea.

*Volatile Oil.*—Oil of sassafras varies in color from colorless to yellow and red. The New Jersey oil is generally light-colored and often colorless when recent, and often has water adherent to its surface from not having been filtered. The Pennsylvania and Maryland oil, as has been said, is red, yellow and white or colorless. Its taste is pungent and aromatic, being agreeable to most persons. Its specific gravity varies from 1.087 to 1.094, increasing somewhat by age, although by no means so easily affected as the oils of the orange or mint tribes. It is neutral to test paper, yet, according to E. S. Wayne, it acted on lead in the solder of a copper can, forming an insoluble compound. Mr. Wayne did not investigate the circumstances under which this supposed compound was formed, nor whether the organic portion of the compound was oil of sassafras or a derivative of it. According to St. Evre, it begins to boil at 239° F., then the boiling point rises to 440° F. In my own trial there was no preliminary ebullition, but long before boiling commenced the oil evaporated in great clouds of vapor. When the mercury approached 430° F., ebullition commenced pretty freely. Its frequent adulteration in Europe with oil of lavender, and perhaps turpentine, will account for the low boiling point of other observers. Its composition is  $C_{18}H_{10}O_4$  (St. Evre). When pure oil of sassafras is cooled by a freezing mixture, it deposits *sassafras camphor*, a crystalline stearoptene, which may be obtained by pressing the cooled oil in bibulous paper. Its specific gravity is 1.245. This body has the composition  $C_{20}H_{10}O_4$ , containing two equivalents more of carbon than the oil. It does not appear to be a derivative of the oil by oxidation. Oil of sassafras is rapidly oxidized by  $NO^5$  with the emission of flame, and  $SO^3, HO$  resinifies it, producing a deep red compound called *sassarubrin* by Dr. Hare. Chlorine and bromine both unite with it without disorganizing its constituents, the latter making a crystalline compound. Gaseous chlorine develops a compound having the composition of ordinary camphor.

Oil of sassafras is readily soluble in alcohol, ether, chloroform, and mixes with other fixed and volatile oils. Like oil of camphor, it is very penetrating and stimulating, being well

adapted for liniments, into many of which it enters; it is also used as a carminative.

In conclusion it may be remarked that sassafras is employed much more in domestic practice than by physicians. Its bark is used officinally in the compound decoction of sarsaparilla, its pith in mucilage sassafras, and its oil in troches of cubeb; but in many cases where the bark might be employed it is passed by. When finely powdered, the bark of sassafras is better than Peruvian bark for dentifrices, having its astringency and antiseptic power with the grateful aroma of the sassafras; besides its powder is very like cinchona in color. The alcoholic extract of the fresh bark is a deep red astringent substance, strongly aromatic and pungent. It is not improbable that other barks, as cinchona, may resemble sassafras in being nearly colorless when in a growing state and altering by the drying process. The writer believes he has somewhere seen this remarked of recent cinchona bark. It is probable that this change occurs in cinnamon bark during the process of drying, and possibly also in *Krameria* root. The actual changes that occur in this transformation of tannin is worthy of a closer study by organic chemists than they have yet given it.

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#### ON URTICA DIOICA (STINGING NETTLE).

By BENJAMIN SHOEMAKER, JR.

(Extract from an Inaugural Essay.)

The object of the author in writing on this plant was to discover, if possible, upon what constituent the diuretic properties of the root depended. The plant is covered with minute tubular hairs, which transmit a poisonous fluid on being pressed. This fluid is said to be formic acid. The root is known to possess diuretic properties. An infusion of the root has been used by some physicians of this city with great success in cases of dropsy, and other diseases where a diuretic medicine was indicated. The author inferred that the diuretic power depended on a volatile principle.

One pound of the ground root was exhausted with water, and the infusion evaporated to a pint, during which a disagreeable

odor was given off at the beginning, but none toward the last. The fluid extract thus prepared had a syrupy consistence, and a dark brown color. This was tried in doses of a fluidounce without any perceptible diuretic effect, which led to the conclusion that the diuretic principle was lost or destroyed in the process of making.

A pound and a half of the bruised root was macerated in seven pints of alcohol (sp. gr. .835) for two weeks. The tincture when decanted had a light green color; it was distilled till nearly all the alcohol was recovered; and the residue, on being thrown into water, afforded a resinous precipitate. This was collected, further purified by solution in alcohol and evaporation, when a soft green resin was obtained, which possessed no diuretic power. The portion of precipitate left undissolved by the alcohol was treated by ether, which took up from it a brown resinous matter, that, when isolated, had no diuretic power.

The author then sought for the diuretic principle in the dregs of the root left by the alcohol, by putting it in a still with eight pints of water, and distilled first one pint, which was set aside on account of its being strongly alcoholic, and then four pints. Both distillates had a very disagreeable odor; the alcoholic distillate had a greenish yellow color, and the aqueous was milky. The liquid remaining in the still had no active properties, but both the distillates were quite powerfully diuretic.

The author took the aqueous distillate in doses of two fluidounces, at intervals of half an hour, until he had taken half a pint. The effect of the medicine on the kidneys became evident after the second dose, and did not pass off until next morning. The alcoholic distillate, in doses of half a fluidounce, also had a diuretic action.

The author's reasons for believing the active principle to be a volatile oil, are, that it has a warm penetrating odor, made a clear solution in alcohol, and a milky mixture with water. Tannin and iodohydrargyrate of potassium did not give any indications of a volatile alkaloid. He did not pursue the subject further in this direction, but states that among the fixed principles of the root are starch, gum, albumen, lignin, sugar, and two resins.

## CYPRIPEDIUM PUBESCENS.

By HENRY C. BLAIR.

(Extract from an Inaugural Essay.)

There are several species of *Cypripedium* found in the woodlands of the United States; the species *pubescens* is considered the most medicinal, and is introduced into the secondary list of the United States Pharmacopœia. It is an herbaceous plant, about one or two feet high, having a pubescent leafy stem. The leaves are also pubescent, ovate, narrow at the base, and about four or five inches long by two in breadth. The flower yellow, slipper-shaped,—and hence its common name of “ladies’ slipper,” or “moccasin plant.” The fruit is an oblong capsule, tapering at each end. It is found most abundantly in rich moist woods. The root is fibrous, like Valerian, and, as it, is used as an antispasmodic. [It has acquired the name of American Valerian, a very improper designation, which has caused it to be confounded with the true Valerian which is cultivated in this country.]

The dried root of the shops has a small knotted head or caudex, with numerous fibres much thicker than *Serpentaria*, and about four inches long. The cortical portion is of a brownish color, the woody part being much lighter. It has a peculiar heavy penetrating and unpleasant odor, somewhat like that of Valerian, and a sweetish bitter persistent taste.

1. The author, in seeking for the volatile principle, subjected the root to distillation with water. The distillate was returned on a new portion of the root, and the cohobation continued until four portions had been used. The last distillate had a milky appearance, with a small portion of a light volatile oil floating on its surface. The distilled water possessed an acid reaction.

2. A portion of the root was exhausted by alcohol. The tincture was colored blue-black by sesqui-chloride of iron. The alcoholic extract treated with ether yielded, by evaporation, a bitter astringent resinous substance. Water removed its astringency, and when treated by charcoal its color became light yellow, the bitterness being retained.

When the alcoholic extract was washed with water, and the



tannin precipitated from the washings by gelatin in excess, the filtrate was colored black by sesqui-chloride of iron, which was decolorized by heat, indicating gallic acid. A cold aqueous infusion was found to contain glucose and gum, but no albumen. A decoction contained starch.

The ethereal extract of the root, purified by alcohol, charcoal, and water, had a light yellow color, a peculiar gutta-percha-like odor, and produced a burning sensation when placed on the tongue. It was *soluble* in chloroform, and burned with a greenish flame.

The ashes of the root contained salts of lime, potassa and magnesia.

In conclusion, it may be stated that *Cypripedium* was found to contain a volatile oil, a volatile acid, tannin, gallic acid, two resins, gum glucose, starch, and ligneous matter.

#### ON CUNILA, MARIANA (AMERICAN DITTANY).

By PHILIP MILLEMAN, of Chicago.

(Extracted from an Inaugural Essay.)

This is a small indigenous perennial plant found growing on rocky, dry, shady hills and woods, from New England to Georgia and Arkansas, flowering through June, July, and sometimes to October. This plant, called also *stone mint* and *mountain dittany*, has both in its recent and dried state a very warm, pungent, spicy taste, analogous to that of *Monarda punctata*—a fact suggested to me by Prof. Procter—and the object of this thesis is to trace how far the analogy is borne out by experiment.

A quantity of the fresh herb was obtained in Chester County, Pa., where it grows in great abundance on and along the hills of that section. This was carefully garbled and sliced transversely. Five pounds were introduced into a tin still of ten gallons' capacity, and eight gallons of water added. Heat was applied until a gallon and a half of distillate had passed, on which floated three fluidrachms and a half of a reddish amber-colored volatile oil.

A comparison was instituted between this oil and that of *Monarda punctata*. Their color is very similar, being reddish amber-colored; but the oil of dittany, by exposure to light,

becomes clear light yellow. Its odor is of a delicate fragrant character, very closely resembling the oil of *Monarda*, making it in this respect somewhat difficult to distinguish them apart. The taste of oil of dittany is warm, pungent, and causes coughing. When rubbed on the skin it produces but a slight redness, which soon disappears. In doses of five or ten drops it acts as a carminative, and when 15 to 20 drops are taken diaphoresis follows.

Its specific gravity is .920; it is readily soluble in alcohol, ether and chloroform. Iodine decomposes it with white vapors, sulphuric acid reddens and decomposes it, nitric acid resinifies it, and hydrochloric acid decolorizes it, but on exposure the color returns.

A portion of the oil exposed in a watch glass until it evaporated left a small quantity of crystalline grains.

The author then made an examination of the dried herb, in which he found tannic acid, a trace of glucose, no vegetable albumen, gummy matter, no starch, but considerable extractive matter, a part of which was bitter and acid, and dark green resin. The ash contained salts of potassa, lime, magnesia, and iron.

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#### ON SANGUINARIA CANADENSIS.

By THOMAS M. NEWBOLD.

(Extracted from an Inaugural Essay.)

The author, after stating the condition of his subject as recited in the U. S. Dispensatory, in which three principles are described, viz., *sanguinaria*, by Dana, *porphyroxin*, by Riegel, and *pucine*, by Wayne, and probably *Chelidonic Acid*, says the main object of these experiments were to isolate the acid principle of the root. This he proposed to do by exhausting the root with a menstruum which would not disturb the chemical status of the alkaloids and acid or acids, and then by precipitating by ammonia to get the acid in combination with ammonia in the liquid filtered from the alkaloids, and then separating the acid as a lead salt, and the lead from this by hydrosulphuric acid.

In pursuance of this plan a pint of the officinal tincture was precipitated by aqua ammonia in slight excess; the precipitate

separated by a filter; the filtrate, still of a red color, was slightly heated to dispel the excess of ammonia and precipitated by acetate of lead. This precipitate was washed, suspended in water and decomposed by sulphuretted hydrogen. The filtrate, heated and filtered, had a slightly yellowish color, and on careful evaporation afforded a thick syrupy liquid of deep red color and sharp acid taste, reddening litmus paper, very soluble in water, partially in alcohol but insoluble in ether and chloroform. Treatment by alcohol and evaporation separated some extraneous matter, but the result contained no crystals.

A second experiment was made with four ounces of the root in coarse powder, which was exhausted by displacement with cold water. The infusion was treated by ammonia, acetate of lead and hydrosulphuric acid, as before, and on evaporation a similar red acid liquid was obtained, from which small acicular crystals deposited on cooling. These were separated, purified by alcohol and animal charcoal, and were re-obtained in nearly colorless fasciculate crystals. After purification only two grains were obtained. (1.) This substance had an acid reaction, was soft under the teeth and almost tasteless. (2.) Moderately heated on platinum foil it fused with effervescence, formed a red liquid, was inflamed and left a black residue dissipated by further heat. (3.) It was decomposed with orange fumes by weak nitric acid. (4.) Also by fuming nitric acid. (5.) The crystals dissolve in strong sulphuric acid without apparent change, but on adding a drop of nitric acid it changes to yellow with a pink edge, which is evanescent. (6.) Their aqueous solution was precipitated black by nitrate of silver. Several of these reactions are given by Lowig as characteristic of Chelidonic acid, but other characters do not agree with that substance. As by far the larger portion of the acid matter is not crystallizable, the author believes it to be a liquid non-volatile acid which he calls *Sanguinarinic acid*.

Further experiments are needed to determine its true character.

#### OBSERVATIONS ON SOME PRODUCTIONS OF MEXICO.

By M. GUIBOUT.

[The author devotes twelve pages in the August number of

the *Journal de Pharmacie* to an account of some Mexican productions, which we propose to give a notice of in a condensed form. Ever since the French expedition to Mexico, occasional articles have appeared throwing light on the products of that country. M. Guibourt had received a little work on Mexican *Materia Medica*, published in 1832 by M. Cal, of Puebla, and had corresponded and inquired, but owes his ability to write the present memoir to an accidental visit to the Laboratory of the MM. Merck, of Darmstadt, in 1865, on the occasion of his attendance on the International Pharmaceutical Congress at Brunswick. These gentlemen exhibited a collection of Mexican drugs, received from M. Schaffner as early as 1851; that gentleman, who is a pharmacist and botanist, residing in that country, wrote to M. Guibourt in 1854, asking his opinion of a variety of productions that he was about sending him, and giving considerable information about them. The specimens never came to hand, and of course M. Guibourt could not give his opinion of them, and laid the letter of M. Schaffner aside, until his attention was recalled to it by his visit to M. Merck, which, in his communication, he offers as a reason why M. Schaffner was never replied to. We propose to notice the subject in a different order, placing the more important first.—EDITOR. AMER. JOUR. PHAR.]

#### CEVADILLA.

*Cébadilla* or *Cebolleja*, *Veratrum Sabadilla*, L. According to M. Cal, this plant grows in *Terra Caliente*, the hot region of Mexico. The root is acrid, and sternutatory as the seeds, and enters into the composition of the powders of Sandoval. The seeds are acrid and irritating; applied externally they cause inflammation of the skin, and taken internally they produce pain in the stomach, and vomiting. They are employed, however, to destroy lice, and for intestinal lumbrici, and have been prescribed for *tænia*, but it is needful to use great circumspection. In the letter of M. Schaffner (1854,) he criticises me for supposing that the *Veratrum sabadilla* of Retz did not grow in Mexico, and for this reason, that this plant could not yield the *cavadilla* of commerce. He announced that he had sent specimens (which I did not receive,) and closes his letter by a memoir

which he had presented to the Mexican Academy, and expressed a wish that it be published in France. It has already been explained how this memoir came to light, by a visit to M. Merck, from which the following extract is made:

"The *legitimate* cevadilla may be produced by the following plants, viz:

(A.) *Asagraea officinalis*, Lindley, *Veratrum officinale* of Schlechtendahl, *Schoenocaulon officinale* of H. Gray, *Sabadilla* of Orizaba, *cebadilla* or *cebolleja* of the inhabitants of tierra caliente of Vera Cruz.

(B.) *Veratrum Sabadilla*, Retz., Orfilea Desc., *sabadilla* or *cebadilla* of the Interior.

(C.) *Veratrum virescens*,  
(D.) *Asagraea tenuifolia*, } of Martens and Galeotti.

I am certain that A and B furnish the true cevadilla; according to MM. Martens and Galeotti, C and D produce a similar fruit.

*Note.* According to me (Schaffner,) the new species C is only a variety of B, and D is a variety of A. They are very much alike, and the differential characters do not appear to be constant or well proven.

The plant A is very common in the hot country about Vera Cruz, and there is called *cebadilla* and *cebolleja*, as being the mother plant of these two products\*. It is this from which I have always exclusively received the capsules for sending to Vera Cruz for exportation to Europe.

To distinguish the capsules produced by A and B, I have found the following characteristic differences:

The *cebadilla* of *Asagraea* (A) has an elongated form, and is terminated by sharp divisions. It is of a greenish yellow color, coriaceous consistence, and retains sometimes at its base the oblong yellow petals. The *cebadilla* of *Veratrum* (B.) is rounder and the divisions are oval. The capsule and seeds have a deeper color, and the petals are purple colored.

Cevadilla is subject to falsification. The Indians sell to pharmaciens, besides the capsules of B, another product

\* I suppose that the fruit is called *cebadilla*, and the root *cebolleja*.—G.



which they also call *cebadilla*, and sell it alone or mixed with the *cevadilla* of *Veratrum*.

This false *cevadilla* is the capsule of two plants of the natural order Scrophulariaceæ, and genus *Chelone* L., or *Pentastemon* of L'héritier and Endlicher. I characterize them thus :

- |  |   |                           |
|--|---|---------------------------|
| 1. <i>Filamento sterilis glabro.</i>   | } | <i>Pentastemon</i> Benth. |
| <i>Chelone gentianoides</i> , H. B. K. |   |                           |
| 2. <i>Filamento superus barbato.</i>   |   |                           |
| <i>Chelone companulata</i> , Cav.      |   |                           |

"These two plants are very abundant on the plateau of Mexico. The difference most apparent which characterizes their capsules, is that they are naturally open, or that they separate easily into four regular parts, of which the two principal divide a second time into two parts; further, they have the hardness and consistence of horn. The true *cevadilla* presents always three divisions at the summit, and its capsule is much thinner and lighter.

"The seeds of the false *cevadilla* are much smaller and very numerous; those of the true *cevadilla* are less numerous, elongated and terminated in a curved point at one extremity; they are very brown and nearly black."

M. Schaffner finally cites a plant in the valley of Mexico which is very poisonous, and so dangerous for cattle that they avoid the lands where it grows abundantly.

It is the *Veratrum frigidum* of Schlechtendahl (*Stenanthum frigidum* Kunth.) M. Schaffner had not seen the capsule.

I will add that, after reading this account, I have carefully examined the *sabadilla* in the collection of the School of Pharmacy, and in a quantity of about a pound have not found a single capsule of the Scrophulariaceæ, nor but a dozen brownish capsules elliptical and thin, which may possibly belong to *Veratrum sabadilla*. They were empty of seed, and I could observe no difference in the loose seeds. It appears to me certain that it is the *Asagraea officinalis* which furnishes, nearly exclusively, the *cevadilla* of commerce.

I ought to mention that M. Lucien Biart, in his letter to the Minister of Public Instruction, says that the seeds of *cevadilla* participate but little in the energetic properties of the capsule. This is contrary to the received view, and may have been

adopted without sufficient investigation. It will make a good subject for an inaugural essay.

#### BARBUDILLA. CONTRAYERVA.

These names are applied to very different plants; the former, named specially *barbudilla*, is the *Dorstenia Contrayerva*, L.; the other, called *julimes* by M. Schaffner, is *Asclepias Contrayerva* of the unedited Flora Mexicana. I have explained, in the "*Histoire Abrégée des drogues simples*, ii. 300," that the true *Contrayerva* of the shops is *Dorstenia braziliensis*, Lamarck, and Nees v. Essenbeck, and not the *Dorstenia Contrayerva* which grows in Mexico. What most interests me is to find through M. Merck that the root of *Asclepias Contrayerva* has been recognized as the substance always sold in Europe under the name of Mechoacan root. This resemblance also struck M. Schaffner, who writes in 1851:

"I have received, under the name *raiz de Michoacan variable*, a root which resembles in no respect that sold in Germany as white Jalap. Sometimes it seems to me that this root (of the *Asclepias*) peeled, does not differ from that formerly known under the name of *white Mechoacan root*."

M. Schaffner, writing to me in 1854, says:

"A thing which excites my curiosity is to see the root named *raiz de Michoacan*, which comes directly from the province of that name, has none of the characters attributed by you to the root which circulates in Europe under the same name. In visiting various Pharmacies in Mexico, I have found under the name of *Dorstenia of the country*, or *barbudilla*, the root of the *Asclepias Contrayerva*, very similar to that you have described under the name of *mechoacan*."

Notwithstanding the confusion which appears between *barbudilla* and *Asclepias Contrayerva*, it remains not the less true that the substance sold in Europe under the name of Mechoacan is the root of *Asclepias Contrayerva*. I will speak now of that which appears to be the true Mechoacan.

#### MECHOACHAN, MALE JALAP.

It is a long time since I have given the opinion that the Me-

choacan root of commerce was not that of a *Convolvulus*, and I thought then that it belonged to a *Tamus* of the family Dioscoreæ. I am sustained in this idea by finding subsequently in the *Histoire des drogues* of Colin, printed in 1619, that in his time they sold as Mechoacan the root of the Seal of our Lady (*Tamus communis*, L.), and I asked myself then whether the root of Mechoacan of commerce was the result of a fraudulent substitution executed in Europe, or if, being really imported from Mexico, we must be deceived in the plant producing it.

According to what has been said in the previous article, it becomes almost certain that the root sold in Europe under the name of *Méchoacan* comes from Mexico, and that it is due to *Asclepias Contrayerva*, of the Mexican flora.

As to the true Mechoacan, M. Schaffner, in 1854, had not yet seen the plant which produces it, but according to the sample which he had sent to M. Merck, this root does not differ from *fusiform* or *Male Jalap* of Ledanois, and it follows that we cannot admit that M. Ledanois has discovered a new jalap; he has only found a root which preceded jalap in its application to medicine.

M. Bourgeau some time ago sent to the School of Pharmacy a species of jalap which he said was produced by a species of *Ipomea* abundant in Pédrégal, in the valley of Mexico. This root has close relations with *fusiform* jalap, with which it is found mixed in commerce, but it is more succulent, and more amylaceous; it is generally of a pale reddish-brown, and presents, when cut transversely, a compact structure, brown marbled with black. These differences may be due to the season of collection or the mode of drying. Besides, the root of M. Bourgeau has a musty odor, very marked.

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Besides the foregoing, M. Guibourt describes the following substances:

*Chapuy Yerba de las animas* (*Helenium autumnale*, L.)—This plant grows abundantly near Puebla; all parts of it are strongly sternutatory, but particularly the flowers and the seed.

*Chia* (*Salvia hispanica*), the seeds of which possess mucilagi-

nous properties, like quince seeds, and contain a fixed oil, sold under the name of *aceite de chia* in Mexico.

*White Copal*, *Heliocarpus copallifera* (tiliaceæ).—A resin from the hot country of the coast, which is nearly colorless, and has an aromatic but unpleasant odor. The aborigines employed it for fumigation. It is used in medicine as an application for ulcers.

*Gum of Maguey*.—The *Maguey* (*Agave americana*), noted for its saccharine juice and the liquor *pulque* it affords by fermentation, also yields, by spontaneous exudation from its leaves, a gum closely resembling gum arabic. M. Bazire says the *pulque* *Agave* is another species, the *A. americana* having a bitter juice.

M. Biart considers this gum more lauded than used. A sample sent to M. Guibourt was found to consist of conglomerated translucent tears, which possess a certain resemblance to gum arabic. Macerated in water the tears separate readily, and partially dissolve. The solution is precipitated by alcohol, and the precipitate, besides gum, contains malate of lime. The undissolved portion is chiefly bassorin.

*Mexican Gum Acacia*, or *Gum Mizquilt*.—This is the *gum Mezquite* described at vol. xxvii. p. 14, of the American Journal of Pharmacy, brought by Dr. Shumard from the region of upper Texas.

*Gomme de Nopal*.—Derived from several species of cactus by exudation, and resembles the *false tragacanth*, or *Bassora gum* of commerce.

*Gomme de Sonora* is a name given to an exudation caused by an insect,—a species of coccus,—and is analogous to shellac. The name of the plant is not given.

*Molle, Tree of Peru, False Pimenta* (*Schinus molle*, L.)—This elegant tree extends through Mexico. Its bark is an astringent, its leaves used in fomentations, and the fruit, the size of pepper, is aromatic and stimulant. By expression the berries yield an oleoresin like Canada Balsam, and the trunk yields a thick viscid juice which concretes into an insoluble kind of gum resin, having much bitterness and a disagreeable odor.

*Ule* (*Castilleja elastica*, Cerv.) belongs to the natural order *Artocarpeæ*, and yields a milky juice rich in caoutchouc.

## GLEANINGS FROM THE FRENCH JOURNALS.

*Niauli of New Caledonia.*—This is a species of myrtle of the genus *Melaleuca*, probably *viridiflora* of botanists. The tree is very common in New Caledonia, and its leaves are said to possess medicinal properties. According to the Abbé Montrouzier, Curé of Layta, in that country, the natives employ the leaves to remove the impurities of water. It is also used to improve the taste of liquors, and when the young leaves are dried they are used as a substitute for tea. An apothecary of Sidney sells a specific for rheumatism which is said to be made of this plant. If physicians find any real virtues in this plant it will be a source of advantage to the colony.—*Jour. de Pharm.*, Sept.

*Cadmiate of Potassa.*—M. Stanislaus Meunier states that he has obtained a crystallized compound of oxide of cadmium and potassa. Having ascertained that melted potassa would dissolve oxide of cadmium, a lye of potassa was thrown into the melted mixture from time to time, which caused the precipitation of a white powder which is soon redissolved. When this is continued, a period arrives when the precipitate ceases to be redissolved, when, by slow cooling, the mass is nearly entirely transformed into little crystals of hydrate of potassa. There is, nevertheless, at the bottom of the vessel a deposit of a white matter and crystals resting in an excess of alkaline lye. These are separated and dried on paper with care. The author has not thoroughly investigated this compound.—*Jour. de Pharm.*, 176, Sept., 1866.

*Cafetannic Acid.*—M. Hlasiwetz finds this acid to be a glucoside consisting of glucose and crystallizable acid,  $C_{15}H_{16}O_8$ , that the author calls *cafeic acid*. This new acid is allied to *ferulic acid* previously discovered in *assafœtida*.

*Carminic Acid*, according to MM. Hlasiwetz and Grabowsky, is also a glucoside, resolved by ebullition in diluted sulphuric acid into glucose and *carmine red*. Melted with hydrated potassa, carmine red forms a new crystallizable compound called by the authors *coccinin*. This is in yellow lamellated crystals, remarkable by the beautiful colorations it produces with different reagents.—*Jour. de Pharm.*, Sept.

*Physiological Effects of the Nitrate of Methyl Strychnia.* By



M. SCHROFF.—In confirming the curious fact heretofore announced by M. Stahl Schmidt, (see *Jour. de Pharm.*, t. xxxvii., p. 228,) viz., the perfect innocuity of methyl strychnia when introduced into the stomach, M. Schroff has ascertained that this base, when put in contact with the blood by subcutaneous injection, is a powerful poison, because under these circumstances it recovers or resumes the poisonous properties which characterize strychnia. The author calls attention to the fact that the *curara arrow poison* may be ingested with equal freedom, and queries whether it is not of the same nature as methyl strychnia.

The experiments were made on rabbits and frogs, and the specimen employed was the nitrate prepared by M. de Vry.—*Jour. de Pharm.*, 235, Sept.

*Cholestearine in Carrots.*—MM. Frorde and Søauer (*Arch. der Pharm.*) state that the proximate principles called *carotin* and *hydrocarotin* are simply *cholestérin* colored by a red pigment.

They possess its crystalline form, its solubility in different vehicles, its indifference to reagents, and its centesimal composition.

There appears to be no fixed relation between the proportion of these crystals and that of starch in the carrot. This is not the first time that this animal principle cholestearine has been found in vegetables, (see *Jour. de Pharm.*, xlii., p. 527). Schmidt has found 7 to 8 per cent. of cane sugar in the carrot, and the authors have recognized, in addition, asparagin and bimalate of lime.—*Jour. de Pharm.*, Sept., 1866.

*Preparation of Soluble Prussian Blue.* By M. BRUCKE.—Anatomists and physiologists have long used soluble Prussian blue for injecting their preparations. It was M. Schröder von der Kolk who first made this application, now so much esteemed. It is very important that the Prussian blue be soluble in water. To obtain it in this form it is necessary to use a great excess of yellow prussiate in concentrated solution; the iron should be in a state of sesqui-chloride, of which one-eighth to one-tenth of the prussiate employed should be used. It should be washed on a filter with water until it commences to blue the washings, when it should be expressed and dried in the air.

On a small scale, soluble Prussian blue can be made economically in the following way:—Make on the one hand a solution of yellow prussiate containing 21·7 per cent. of that salt by weight; on the other, a solution of one part of solid sesquichloride of iron in ten of water. Take equal volumes of these solutions, and add to *each* twice its volume of a cold concentrated solution of sulphate of soda; then pour the sesquichloride into the prussiate, stirring constantly; throw the whole on a filter, and when it has drained, wash with cold water until it begins to color the water. The product when dry is perfectly soluble in water, and makes beautiful injections.—*Jour. de Pharm.*, Sept., 1866.

*Strychnia in Strychnos Tieuté.*—M. Bernelot-Moens (*Zeitschr. fur Chem.*, 1866,) says *Strychnos tieute* grows spontaneously in Java, and that its seeds are richer in strychnia than *nux vomica*. When dry, they contain 1·469 per cent. of this alkaloid, with but traces of brucia.

*Aspartic Acid in Beet Root Molasses.* M. SCHREIBLER, (*Zeitsch. fur Chem.*, 1866).—Asparagin has been discovered in beet juice by M. Dubrunfont, whilst others have failed in finding it. The author attributes this failure to the fact that when the juice is defecated with lime, the asparagin is converted into aspartic acid and ammonia, and is thus lost; and he attributes to this cause the evolution of ammonia always observed in beet sugar-making when lime is used. He obtains it thus:—The molasses, diluted conveniently, is precipitated first with basic acetate of lead in slight excess, filtered, and a solution of nitrate of protoxide of mercury added, which throws down the acid as aspartate of mercury, which is washed and decomposed with sulphuretted hydrogen, filtered and evaporated to a syrupy consistence, which, on standing, deposits prismatic crystals of the acid. These are washed with cold and hot alcohol, and afterwards recrystallized from water. The author has also found an alkaloid which is very soluble in water and alcohol, and possesses a strong odor of musk. It is deliquescent, and by heat gives off ammonia, accompanied by an odor of prussic acid and caramel. M. Nickles says that this is probably triethylammin.—*Jour. de Pharm.*, Sept., 1866.

*Oleic Acid*.—MM. Bolley and Borgmann have examined the question whether oleic acid is susceptible of distillation without decomposition, and they establish that this acid is volatilized unaltered at the temperature of 482° F., in a current of superheated steam. But they have also determined that at a more elevated temperature decomposition sets in, and the product becomes contaminated with derivative products, acid and neutral, among which are capric and caprilic acids, and some hydrocarbons.

This state of things explains therefore the preference that soapmakers accord to oleic acid from lime soap, to the detriment of oleic acid by the action of sulphuric acid and subsequent distillation. The former saponifies best and more completely than acid distilled at an irregular temperature, because it is exempt from neutre fats, which embarrass the soapmaker.—*Repert. de Pharm.*, Mai, 1866.

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#### BEET-SUGAR—PROGRESS OF ITS MANUFACTURE IN FRANCE AND GERMANY.

We copy the following interesting remarks upon the production of beet-sugar in Europe, from the *Monthly Report of the Department of Agriculture* for April. They occur as an introduction to a communication upon the same subject addressed by our Consul at Berlin to the State Department. The communication itself is statistical and contains little in addition to the information contained in the communication of our intelligent correspondent, Mr. Hirsh, which appeared in a recent number of the *Journal*, and we therefore omit it :

Although the manufacture of beet-sugar was first established in France, yet the fact that the beet yielded sugar was first ascertained by Margraff, a Prussian, in 1747. But no practical good was accomplished by him. Twenty-five years afterward, another chemist of Berlin, Archard, renewed the investigation of the subject, under the encouragement of Frederick the Great, but it was not until 1795 that he published anything in reference to it. In theory he maintained the utility of the manufacture, not only for the sugar that the beet would yield, but because of the profitable use that might be made of the leaves and pulp

after the pressure from it of the juice, and the manufacture into alcohol or vinegar of the residues left of the sugar manufacture.

In 1799 he made the first sugar from a farm of sixty acres in beet cultivation. A commission reported favorably, and in the same year the subject was first investigated in France, and the society of agriculture of the Seine awarded a gold medal to Archard. The wars of the first Napoleon leading to a blockade of the ports of the continent, sugar, in France, rose to \$1.20 per pound. This forced Napoleon to a consideration of the best ways of obtaining a home-made supply, and he appointed a commission to examine and report on the matter. In 1810 they made their report in favor of beet-sugar. In 1812, Benjamin Delessert succeeded in producing refined crystallized white beet-sugar, for which the Emperor conferred upon him the Cross. Soon afterward  $1\frac{1}{2}$  per cent. of sugar on the weight of the beet worked was obtained, at a cost of  $30\frac{1}{2}$  cents per pound. In 1813, 3,500 tons of 2,240 pounds were made by 334 manufacturers.

The peace of 1814 raised the blockade from the ports, and the price of sugar from \$1.20 per pound fell to 14 cents, causing the stoppage of all the manufactories that had been erected for the production of beet-sugar.

France at that time had, as cane-producing colonies, Martinique, Guadeloupe, Guyana and Boulon, and in 1814, Louis XVIII., King of France, laid a duty of \$80 per ton on French colonial sugar, and \$200 per ton on all foreign sugar. In 1825 the manufacture of the beet-sugar began to revive, and in 1828 there were 58 manufactories, yielding 2,685 tons of sugar.

At that time, in order to encourage the refining of sugar in France, foreign and colonial cane-sugar was admitted in its brown state only, and a premium upon exportation of the refined sugar was allowed the refiners. These opposed the manufacture of refined sugar from the beet, and combining with the shipping interest in the foreign and colonial sugar trade, demanded an internal tax upon beet-sugar. This demand was defeated, especially through the political events of 1830, and the production of beet-sugar increased. In 1834 it was 20,000 tons; in 1836, 40,000 tons, made in 436 manufactories. But the opponents to this domestic production continued the conflict, and at last suc-

ceeded in having an excise tax laid upon it of \$32.88 per ton in 1838. The unfavorable influence of this tax caused a decrease of production, so that in 1840 but 22,000 tons were made, 166 factories were closed, and the manufacture of sugar ceased in 17 departments. In 1840 further legislation was had, resulting in fixing a duty on colonial cane-sugar of \$90 per ton, and an excise tax on beet-sugar of \$50 per ton; a discrimination of \$40 per ton in favor of the latter. In 1842 the quantity of beet-sugar rose to 33,000 tons, but the colonial opposition was renewed, and the government proposed to the Chambers the entire suppression of the beet-sugar trade. It rejected this extraordinary proposition, and the controversy was settled in 1843 by an equal duty and tax of \$90 per ton on colonial and beet-sugar.

In that year the manufacture of beet-sugar was 28,000 tons; the import of colonial sugar 83,000 tons. In 1847 the first advanced to 50,000 tons, the latter to 88,000. In 1850, the beet-sugar production reached 62,000 tons, and the colonial cane-sugar had decreased to 51,000 tons. In 1852 another change unfavorable to beet-sugar was made by the tariff regulations, and this was followed by two seasons unfavorable for growing the beet; but in 1853 a disease of the vine greatly lessened grape alcohol, which doubled in price, when the manufacturers of beet-sugar turned their attention to the production of alcohol from the beet. The production of beet-spirit in 1852 was 352,000 gallons; in 1857 it was 9,240,000 gallons, and that from the vine showed almost an equal increase. But in this last year the vine recovered from the disease, when the manufacture of beet-sugar was resumed to its full extent. In 1858 its manufacture was 124,000 tons, and the importation of colonial cane-sugar was 116,000 tons.

In 1860 the internal tax was again changed to \$60 per ton on beet-sugar; a duty of \$52.88 was laid on colonial sugar, and of \$66.12 on foreign sugar.

The per cent. of sugar now obtained by improved processes, is from 5 to 6; the Germans get from 7 to 8. But in Prussia greater care is observed in the selection of the beets used. The crop is successively immersed in three different tanks of salt water of the densities of 4, 5 and 6 degrees Baumé; the roots



floating in the first tank are rejected; those which float in the second tank form the third quality of beet; those which float in the third tank constitute the second quality of beet, and those which sink in it make the first class of beet. The cost of the production of beet-sugar has been reduced to about four cents per pound; the tax is about three cents, other charges about  $1\frac{1}{2}$  cent, making the selling price from 9 to 11 cents per pound.—*Druggists' Circular*, Sept., 1866, from *Sorgo Journal*.

#### ON THE ABSORPTION AND DIALYTIC SEPARATION OF GASES BY COLLOID SEPTA.

BY THOMAS GRAHAM, F.R.S.

It appears that a thin film of caoutchouc, such as is furnished by varnished silk or the transparent little balloons of india-rubber, has no porosity, and is really impervious to air as gas. But the same film is capable of liquefying the individual gases of which air is composed, while oxygen and nitrogen in the liquid form are capable of penetrating the substance of the membrane (as ether or naphtha does), and may again evaporate into a vacuum and appear as gases. This penetrating power of air becomes more interesting from the fact that the gases are unequally absorbed and condensed by rubber, oxygen  $2\frac{1}{2}$  times more abundantly than nitrogen, and that they penetrate the rubber in the same proportion. Hence the rubber film may be used as a dialytic sieve for atmospheric air, and allows very constantly 41.6 per cent. of oxygen to pass through, instead of the 21 per cent. usually present in air. The septum keeps back, in fact, one-half of the nitrogen, and allows the other half to pass through with all the oxygen. This dialysed air rekindles wood burning without flame, and is, in fact, exactly intermediate between air and pure oxygen gas in relation to combustion.

One side of the rubber film must be freely exposed to the atmosphere, and the other side be under the influence of a vacuum at the same time. The vacuum may be established within a bag of varnished silk or in a little balloon, the sides being prevented from collapsing by interposing a thickness of felted carpeting between the sides of the varnished cloth, and by filling the

balloon with sifted sawdust. For commanding a vacuum in such experiments, the air exhauster of Dr. Hermann Sprengle\* is admirably adapted. It possesses the advantage that the gas drawn from the vacuum can also be delivered by the instrument into a glass receiver placed over water or mercury. The "fall tube" has merely to be bent at the lower end.

The surprising penetration of platinum and iron tubes by hydrogen gas, discovered by MM. H. Sainte-Claire Deville and Troost, appears to be connected with a power resident in the same and certain other metals to liquefy and absorb hydrogen, possibly in its character as a metallic vapor. Platinum in the form of wire or plate at a low red heat may take up and hold 3.8 volumes of hydrogen, measured cold; but it is by palladium that the property in question appears to be possessed in the highest degree. Palladium foil from the hammered metal, condensed so much as 643 times its volume of hydrogen, at a temperature under 100° C. The same metal had not the slightest absorbent power for either oxygen or nitrogen. The capacity of fused palladium (as also of fused platinum) is considerably reduced; but foil of fused palladium, for which I am indebted to Mr. G. Matthey, still absorbed 68 volumes of gas. A certain degree of porosity may be admitted to exist in these metals, and to the greatest extent in their hammered condition. It is believed that such metallic pores, and indeed all fine pores, are more accessible to liquids than to gases, and in particular to liquid hydrogen. Hence a peculiar dialytic action may reside in certain metallic septa, like a plate of platinum, enabling them to separate hydrogen from other gases.

In the form of sponge, platinum absorbed 1.48 times its volume of hydrogen, and palladium 90 volumes. The former of these metals, in the peculiar condition of platinum black, is already known to take up several hundred volumes of the same gas. The assumed liquefaction of hydrogen in such circumstances appears to be the primary condition of its oxidation at a low temperature. A repellant property possessed by gaseous molecules appears to resist chemical combination as well as to estab-

\* Chemical Society's Journal, ser. 2, vol. iii. p. 9 (1865.)

lish a limit to their power to enter the minuter pores of solid bodies.

Carbonic oxide is taken up more largely than hydrogen by soft iron. Such an occlusion of carbonic oxide by iron at a low red heat appears to be the first and a necessary step in the process of acieration. The gas appears to abandon half its carbon to the iron, when the temperature is afterwards raised to a considerably higher degree.

Silver has a similar relation to oxygen, of which metal the sponge, fritted but not fused, was found to hold in one case so much as 7.49 volumes of oxygen. A plate or wire of the fused metal retains the same property, but much reduced in intensity, as with plates of fused platinum and palladium in their relation to hydrogen.—*Chem. News*, Aug. 24, 1866, from *Proc. Royal Society*.

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#### ON THE ESTIMATION OF MORPHIA IN OPIUM: IMPROVEMENTS ON M. GUILLERMOND'S PROCESS.

By M. ROUSSILLE.

M. Guillermond's process, which consists in macerating the opium in cold alcohol of 72 per cent., is very accurate, but it possesses the inconvenience of being long. I propose to introduce some modifications. 15 grammes of opium are treated with 25 grammes of boiling water till complete disaggregation; then add 60 grammes of boiling alcohol at 40°; digest for an hour, and filter through linen; then treat the residue again with 10 grammes of water and 60 grammes of alcohol as before. Now extract the residue with 50 grammes of boiling absolute alcohol. All the liquids collected together and cooled are to be carefully filtered, evaporated to one-third, and filtered again after cooling. Then precipitate the morphia with 10 grammes of ammonia, and evaporate over sulphuric acid. At the end of three days collect the deposited crystals, and wash them with ether and with water.

Six successive trials have given the same results as by Guillermond's process, which takes more than five days, whilst this only requires three.—*Chem. News*, Oct. 5, 1866.

## ON ACONITE.

By THOS. B. GROVES, F.C.S.

Of the two questions relating to aconite, on which I have undertaken to report, the first is, "Does Aconite owe any of its activity to the volatile acrid body said to exist in it?" I cannot find that this acrid body *said* to exist in aconite has yet been isolated. Its existence has simply been *inferred* from certain circumstances observed in the pharmaceutical treatment of the plant, and from analogy.

M. Geiger was the first to start the theory that aconite owed its acidity to one body, its narcotic property to another; and affirmed that the former was easily destroyed, the latter not so easily. This ready destructibility is supposed by M. Geiger to be a sufficient reason for its non-production; but Mr. Wesse states that ordinary aconite, containing, as he also asserts, the two principles intimately combined, can be purified from the acrid principle by several solutions in acid and precipitations by alkali. He did not, however, succeed in isolating it. Query, whether he did not really, by this mode of procedure, simply lose the greater portion of the aconitine (which is well known to be soluble in 150 parts of cold water), leaving only the inert matter with which the commercial article is so largely contaminated.

Volatility has been accorded to this supposed acrid body, in consequence of the ready dissipation, as some have affirmed, of the activity of aconite by simple drying or by boiling in water. But Christison denies the former statement as regards *Aconitum Napellus*, asserting, on the contrary, that when carefully dried, either by water-bath or spontaneously, its activity is not much impaired; on the other hand, travellers report that the Swedes eat as a pot-herb one species of aconite when boiled. It seems to me that these views may have their origin solely in the ready destructibility of aconitine (a fact no one will gainsay who has occupied himself in its preparation), aided by the argument from analogy of some of the other *Ranunculaceæ*. The genera *Clematis*, *Anemone*, *Ranunculus*, furnish volatile, acrid, oily, or concrete bodies, which fairly represent the powers of the plants whence they are derived. Of these the *Anemonine* has been fully

described, and its composition and reactions tolerably well ascertained; of the others little is known. None appear to be alkaline, but if otherwise than neutral, inclined to acidity. They do not contain sulphur, and are comparable with the acrid principle of the *Arum* rather than that of the *Cruciferae*.

My experiments on the question have been limited to distilling one batch of the plant and one of the fresh roots, my crops of aconite having been comparative failures. The simple distillation of the green plant with water having already been tried without result, I distilled mine with the addition of lime, for the purpose of isolating any basic body of a volatile nature, but held down by acid. The distillate I obtained was from the first distinctly alkaline, had an herbaceous flavor, but was quite limpid. The alkalinity continued during the whole course of the operation, which suggested to me a gradual decomposition rather than a simple elimination. The distillate neutralized with oxalic acid was carefully evaporated at a low temperature to a few ounces. It was then turbid and slightly colored. It gave no indications of the presence of an alkaloid when tested by the usual reagents; and when redistilled with an excess of lime, in order to remove the little organic matter that had come over with the first distillate, it presented the characters of liquid ammonia pure and simple.

The distillation of the bruised roots was conducted in the usual way, water only being added. The distillate was neutral to test-paper, slightly opalescent, but entirely devoid of acidity. It of course smelt and tasted strongly of the plant. The liquid contained no alkaloid, but on applying the usual reagents it clearly manifested the presence of ammonia in minute quantity. It was therefore treated with an excess of pure carbonate of potash, and evaporated with the view of ascertaining the nature of the acid with which the ammonia was combined. When brought to a small bulk the carbonate was neutralized with sulphuric acid and rectified spirit added. The filtrate and precipitate, on examination, showed conclusively that no organic acid was present, but that the salt of ammonia was no other than the hydrochlorate in very minute quantity.

After drawing over sufficient distillate for the above purpose,



milk of lime was added to the contents of the still. The distillate then assumed a different character, being decidedly alkaline, as in the case of the green parts of the plant, but the yield of ammonia was much greater.

Some experiments were made with the view of ascertaining if the ammonia could possibly have been derived from the decomposition of aconitine by lime. I found, however, that lime-water gave a distillate decidedly alkaline to test-paper, and that the introduction into the retort of a little aconitine made no appreciable difference. It is, moreover, to be remembered that the roots distilled without lime gave an ammoniacal, though neutral, distillate, and that the quantity of ammonia obtainable by the use of lime, though small, is far greater than could possibly be accounted for on the above supposition. The only principle other than aconitine that I am able to suggest as capable of accounting for the difference observed between the physiological action of aconitine and that of the dried root, is the acrid resin with which the roots may be said to abound. I have no doubt that body does exert an important action when applied topically. The loss of strength observed in drying aconite plants is doubtless due (as I have before said) to the very ready destructibility of the alkaloid aconitine.

My conclusion, "that *Aconitum Napellus* does not contain a volatile acrid body to which may be attributed a part of the poisonous effects of the plant," is one that I had anticipated, for the analogy of the other *Ranunculaceæ* seemed, in my opinion, to point that way. It is true, as some writers have insisted, that *Anemone* and *Ranunculus* furnish acrid volatile principles; it is no less true that they furnish nothing else of much activity. Aconite, on the other hand, has been long known to furnish the alkaloid aconitine—a body sufficiently acrid and energetic to account for the poisonous character of the plant; and it seems to me but probable that in Aconite it occupies the place which in *Ranunculus* and *Anemone* is filled by the volatile acrid bodies to which I have referred.

#### *Aconitine.*

Since the discovery of this alkaloid by Geiger and Wesse, in 1833, it has, from its extreme activity as a poison, and the great

difficulty of obtaining it pure, much attracted the attention of pharmacutists. As a *tour de force*, its preparation possessed a charm for me, so that during the last ten years or so I have made several attempts to obtain it.

Dr. Turnbull was one of the first to introduce it into the medical practice of this country, and himself published several processes for preparing it. The following is his first method,—expressly designed, one would imagine, for showing “how not to do it:”—

“Procure fresh roots of Aconite, dry, and powder; mix one part of root with two parts of spirit, and digest for seven days. The warm tincture filtered, carefully reduce it to a fluid extract. To it add Liquid Ammonia, but not too much, ‘as in some instances the product appears to have been decomposed by inattention to this circumstance.’ The precipitated mass is now boiled with Alcohol or Sulphuric Ether to remove the alkaloid, or treated with cold water to remove the extractive, etc., which last method the doctor prefers, in which case the residue is purified by solution in Alcohol. The light brown or gray powder thus obtained is extremely poisonous; one-third of a grain caused the death of a guinea-pig in a few minutes.”

This process was afterwards somewhat improved by adding cold water to the spiritous extract, filtering off the precipitated resin, and precipitating from the filtrate the alkaloid of ammonia. The purification is effected by washing repeatedly with cold water. The product is said to be white.

This modified form is very nearly that prescribed in P. L. 1826. The P. L. of 1851 entirely omitted both its description and preparation. It is not surprising to find that by following these methods the products of different laboratories were by no means alike, either in activity or chemical characteristics, whilst more frequently the alkaloid was altogether missed. Thence its posterous price (3s. 6d. a grain), and the discredit, so uncertain yet at times so frightfully active an agent began to find attached to it. Thence, also, the contradictory accounts of writers on the subject, some affirming it to be crystallizable, others not so. Similar differences as to its effect on the pupil are yet not settled. The preparation of Mr. Morson is stated to be the only one to

be relied upon for purity, but possibly this is not so true now as it was twenty years ago, when Dr. Pereira swallowed a full grain of a French so-called aconitine, without experiencing from it any effect whatever, whereas Mr. Morson's preparation had caused danger to a patient taking  $\frac{1}{50}$ th of a grain only. Dr. Von Planta, writing in 1850 of Merk's aconitine, found it contained both resinous and earthy matters.

A good deal has lately been written about the chemistry of aconite,—more, in fact, than I care to transcribe. I will, however, point out a very good process for preparing aconitine, devised by MM. Liégois and Wattot. It may be found at length in the forty-fourth volume of the '*Journal de Pharmacie et de Chimie.*' It may be described shortly thus:—

"Macerate for eight days the coarsely-powdered root in sufficient rectified spirit, acidulated slightly with sulphuric acid; express, distil off the greater part of the spirit, and allow the liquid to cool; remove from its surface the floating oil and resin, continue the evaporation to a syrupy consistence, wash lightly with sulphuric ether to remove all traces of resin; add magnesia, agitate several times with sulphuric ether, to remove the alkali; evaporate the sulphuric ether, dissolve the residue in a slight excess of sulphuric acid, precipitate gradually by dilute ammonia, rejecting the first portions which are colored. The latter portions are perfectly white, and, in the opinion of the inventors, respond to all the requirements of pure aconitine." This preparation, nevertheless, shows no tendency to crystallize, and hence differs from most of the aconitines of commerce, which more frequently than not are partly crystalline. It is said, also, to differ from them in possessing much greater activity. The medicinal dose has been fixed at half a milligramme = seventy-seven ten-thousandths of a grain.

The process for aconitine contained in the British Pharmacopœia is a great improvement on its predecessor, and with slight modifications would give fair results.

At the Exhibition of 1862 every pharmacist must have noticed with surprise and pleasure the magnificent specimen of aconitine in perfectly defined large crystals contributed by Mr. Morson. That fact must be admitted to have settled the question

of crystallizability. Moreover, at the same Exhibition I showed small specimens of the same alkaloid crystallized in its free state, as hydrochlorate, hydriodate, and nitrate, which some two years before I had prepared by a process which I will proceed to explain, first observing that it is one of general application.

I prepare a strong tincture of aconite, by macerating for about a week 5 lb. of coarsely-powdered aconite root in 1 lb. of methylated spirit, acidulated with  $2\frac{1}{2}$  oz. of strong hydrochloric acid. The materials being of less value than my time, I simply express the fluid (leaving about one-sixth in the marc unrecovered) add to it half a pint of water, and distil off the spirit. During the distillation the resin and oil gradually separate, leaving the basic matters in possession of the acid watery fluid left in the retort. It is poured from thence to an open basin, and the last traces of spirit chased off. When cool, the clear liquid is separated by pipette and filter from the thick oily mass floating on it. This operation requires both time and patience, but it is advisable to do it well, and completely purge the liquid of matters insoluble in acidulated water. To the clear liquid add a slight excess of a strong solution of iodohydrargyrate of potash; heat gradually the resulting thick creamy fluid to about  $100^{\circ}$ , stirring the while, and separate the concrete resinous mass that results. In this way I have got on the average an ounce of crude iodohydrargyrate, to decompose which is the next business. The best way to do this is to dissolve it in hot methylated spirit, and add a slight excess of nitrate of silver in hot watery solution. By this means the whole of the iodine is removed in the simplest way, but, it may be objected, not in the most economical, as a slight loss may be expected when the iodide transferred to the silver bottle arrives at its appointed time for reduction. The loss, however, is so small as not to be worth consideration when the process is followed on an experimental scale only. In the large way I should treat it first with sulphide of ammonium, then with acetate of lead. It is necessary to use both, as I find the lead alone removes only half the iodine, the remaining half interfering greatly with the subsequent operations. But by first removing the mercury as sulphide, and then using the lead, the liquid is completely cleared of that troublesome element. I could not at first under-

stand the product I obtained by adding ammonia to the liquid containing the aconitine in the presence of iodine, and washing with sulphuric ether, nor at all comprehend why an alkali of some sort did not precipitate the alkaloid from such a solution. It appeared, however, that the hydriodate of aconitine is not decomposable by alkalies, and that when such a mixture is shaken with abundance of sulphuric ether the hydriodate in a pure state is the only thing taken up. An additional embarrassment is felt by the inutility of shaking the sulphuric ether holding the hydriodate in solution with acidulated water with the view of recovering the alkaloid as a muriate or nitrate.

To return from my digression. The liquid filtered from the iodide of silver contains now nitrates of mercury, of silver (in minute quantity), and of the alkaloid, and the latter may at once be obtained in a pure state by adding an excess of carbonate of potash, and washing two or three times with ether. But I prefer first removing the mercury by sulphuretted hydrogen, as it renders the washing with ether so much easier and neater. The ether evaporated or recovered by distillation leaves a residue of a pale brown color, which is partly crystalline, partly translucent like a fused resin, and exhibits a strongly alkaline reaction. On the average I obtained of this rather more than ten grains per pound of root, or, making allowance for that remaining in the marc, twelve grains per pound.

The aconitine is then dissolved in water with a very slight excess of nitric acid, filtered, and set aside to crystallize. This it commences to do at once, one-half or thereabout of the aconitine being so obtainable. I find it crystallizes much more easily as nitrate than as sulphate or hydrochlorate. The crystalline form of the nitrate appears to be the rhombic prism, commonly with dihedral summits. They readily effloresce when heated, losing their transparency, as is the case with the specimen exhibited, which was accidentally exposed to the direct rays of the sun. The nitrate does not dissolve readily in cold water; from its solution in hot water it crystallizes with unusual facility.

Tried on the eye of a cat, it produced during the first half-hour no effect beyond irritation of the neighboring membranes; after an hour it caused permanent dilatation of the pupil. Its color-



test reactions are neutral, nothing marked about them. It is precipitated by bichloride of platinum. From this nitrate the pure crystalline alkaloid is obtainable by the ordinary method—precipitation by ammonia and solution in spirit. It may be objected that this crystalline body is not aconitine. I can only say that it possesses in a high degree the poisonous properties of the root; for some years ago, not being in a position to repeat the experiment quoted by Orfila from Matthioli, viz., the administration of Aconite to *four* highwaymen,—the mediæval response to the proverb "*Fiat experimentum in corpore vili*,"—I took a dog of medium size, and gave him  $\frac{1}{40}$ th of a grain of these crystals. He vomited within an hour after, foamed at the mouth, was purged, with great apparent irritation of the anus, but recovered sufficiently to have a second dose of  $\frac{1}{20}$  grain a few days after, or the next day, I forget which. This, notwithstanding his great efforts to remove the poison from his stomach by vomiting, would certainly have killed him had I not interposed with emollient drinks and careful nursing. The crystalline variety of aconitine ought, I think, to be solely used for the internal administration of Aconite, superseding the present dangerous preparations of root and leaf which now are used so rarely because so unreliable. I would suggest for this purpose a powder of aconitine reduced with sugar of milk to a convenient degree, and also a watery solution with sufficient spirit to keep it from moulding. Half a grain to the ounce—about a thousandth part—would perhaps be a convenient proportion for each.

I ought not perhaps to omit to mention the discovery of Napellin, announced many years ago in the '*Écho Médicale de la Suisse*.' It is described as differing from aconitine in being very sparingly soluble in ether, and not precipitable from acid solution by ammonia. I can only say I have never met with it.

I must say the same of Messrs. Smith's discovery of Narcotin in Aconite Root. I have not heard the discovery affirmed; and as nearly all the processes of late years adopted for the preparation of aconitine would serve equally well for the search for narcotin, as the latter body is also so readily distinguishable from the former by its splendid reaction with nitro-sulphuric acid, contrasting with the negative result, I cannot but think the case

in which it is said to have occurred perfectly exceptional; in fact, were it announced from any other laboratory than that of Messrs. Smith, one would be tempted to ask whether or no, by accident or mischievous design, some narcotin had not been introduced into the aconitine preparation.

The PRESIDENT remarked upon the highly interesting nature of the inquiry as to the existence of a volatile acrid principle in aconite, as had been so confidently asserted in some quarters. Mr. Grove's results appeared to set this matter at rest.

Mr. GILES thought that in speaking of the doses of the more potent alkaloids and other active principles, we should recognize how different were their actions upon different individuals. He had known half a grain of extract of belladonna produce all the symptoms of poisoning. The results of such idiosyncrasies should be borne in mind, and impressed upon physicians who prescribed the more active remedies.

Mr. GROVES could not but reiterate the objections that he had already expressed to the use of galenical preparations of indefinite strength, consequent upon variations in the plants used.—*Proc. Brit. Pharm. Conf. in London Pharm. Jour., Sept., 1866.*

#### ON THE MUTUAL ACTION OF THE ELEMENTS OF SOLUBLE SALTS WITHOUT AND WITHIN THE ANIMAL ECONOMY.

By M. MELSENS.

The experiments already made by the author, he considers, justify him in formulating the following proposition:—

*Two soluble salts which are without apparent mutual action, and which may be given separately to animals without producing any disturbance in the body, may, when administered together, act as a poison:—*

Facts of this kind, proved by experiment, have a great importance, both from physiological and therapeutical points of view.

The two salts more especially experimented with by the author are chlorate of potash and iodide of potassium. These two

salts in solution together crystallize separately under whatever conditions they may be placed. Their mixture in solution in equivalent proportions undergoes no mutual decomposition either at the ordinary temperature, on boiling, or under the pressure of 10 atmospheres at  $185^{\circ}$  C. It can be proved by means of sulphydric acid that no iodate of potash is formed.

But when the two salts are heated together in the dry state, decomposition takes place at the point of fusion, and iodate of potash is formed.

When a certain quantity of mineral acid is added to a mixed solution of the two salts, iodine is set at liberty, and the solution behaves towards sulphydric acid as though iodic acid had been produced.

When the mixed solutions are submitted to electrolysis, hydrogen is disengaged at the positive pole, and the liquor appears to contain both iodide and iodate.\*

We come next to the effects of the before-mentioned salts on animals. Seven grains of chlorate of potash were given to a bitch weighing eleven kilos. every day for a month; the animal did not at all suffer. Afterwards five grammes of iodide of potassium were given daily for the same period. The animal suffered a little during the first days, but at the end of the month was perfectly well.

If, on the contrary, we administer to a dog daily seven grammes of a mixture of iodide of potassium and chlorate of potash in equivalent proportions, the animal languishes and dies about the twenty-fifth or twenty-eighth day. On commencing the experiment one dog weighed 16.5 kilos.; at the moment of its death it weighed only 11.5 kilos. The experiment repeated on several dogs gave similar results. Death often supervened about the fifth day.

\* To avoid the action of chlorine, iodine, and oxygen, the author employed retort coke as the positive electrode. The carbon was previously treated with aqua regia, and then ignited in a current of chlorine. The carbon employed in the above experiment was disaggregated, and in part burnt to carbonic oxide and acid, and at the same time a soluble black carbonaceous matter was obtained, similar to the ulmic product which the author obtained by the action of chlorine on the carbon contained in the lungs in *melanosis*.

Post-mortem examinations revealed changes similar to those observed by the author when iodate of potash was administered, especially in the liver and intestines, but it is necessary to make a series of comparative experiments with the iodate, free iodine, and mixtures of the two salts.

The author has shown in previous memoirs that the iodate of potash acts as a poison. This salt, given in doses of one or two grammes daily, will kill a small dog in a few days. A mixture of the two salts cannot be so active as the iodate, since both unchanged iodide and chlorate may be found in the urine. The author is therefore brought to the conclusion that the mutual action of the two salts in the economy takes place with the greatest facility. It may be supposed that the acids of the stomach and the electrolytic actions which take place in the organism play an important part in bringing about this decomposition. But beyond all hypothesis it is necessary to admit that changes take place in the animal system which cannot be realized in the laboratory under ordinary conditions, or with the assistance of a high temperature, strong acids, or even the electric current.—*Lond. Chem. News*, August 17, 1866, from *Bulletin de la Soc. Chim. de Paris*, July, 1866. Abstract from the *Bull. de l'Acad. Royale de Belgique*, 1866.

#### ON THE EMPLOYMENT OF NITROGLYCERINE IN QUARRIES.

By M. E. KOPP.

The explosive properties of nitroglycerine  $C_3H_5(NO_3)_3O_6$ , and the accounts of experiments made with it in different parts of Sweden, Germany, and Switzerland, determined MM. Schmitt and Dietsch, the proprietors of the great quarries of sandstone in the valley of Zorn, Lower Rhine, to try to use it in their works.

The trial proved so successful, both as regards economy and the ease and rapidity with which the work was performed, that, for the time at least, they have abandoned the use of powder, and the quarries have been entirely worked by nitroglycerine for six weeks.

From the first we have considered that the nitroglycerine should be prepared on the spot; it always seemed to us the transport of an explosive compound of such frightful power ought not to be allowed either by land or water. The terrible accidents which have happened at Aspinwall and at San Francisco, justify these fears, and the transport of nitroglycerine should be positively forbidden.

After having, with M. Keller's assistance, studied in my laboratory the different processes of the preparation of nitroglycerine (mixtures of glycerine with concentrated sulphuric acid and nitrates of potash and soda or with nitric acids of different concentrations), we have determined on the following method of manufacture, which is performed in a wood cabin, constructed in one of the quarries.

1. *Preparation of Nitroglycerine.*—We begin by mixing in an earthenware vessel placed in cold water some fuming nitric acid at 49° or 50° Baumé (1.51—1.53) with twice its weight of the strongest sulphuric acid. These acids are purposely prepared at Dieuze, and sent on to Saverne. At the same time we evaporate in a pot some commercial glycerine free from both lime and lead, until it makes 30° or 31° Baumé (1.26—1.27). This concentrated glycerine should, after cooling, have a syrupy consistence.

The workman then throws 3300 grammes of a mixture of sulphuric and nitric acids well cooled into a glass flask (a pot of earthenware or a capsule of porcelain might equally be employed) placed in a trough of cold water, and then he slowly pours into it, stirring it continually, 500 grammes of glycerine. The thing to be observed is the avoidance of any sensible heating of the mixture, which would determine a tumultuous oxidization of the glycerine and the production of oxalic acid. For this reason it is that the vessel in which the transformation of the glycerine into nitroglycerine takes place, should be constantly cooled externally by cold water.

When the materials are thoroughly mixed, the whole must be left for five or ten minutes; then pour the mixture into five or six times its volume of cold water, to which a rotatory movement must first be imparted. The nitroglycerine precipitates very



rapidly under the form of a heavy oil, which is collected by decantation into a vessel; then wash it with a little water which is in its turn decanted, pour the nitroglycerine into bottles, and it is ready for use.

In this state, the nitroglycerine is still slightly acid and watery; but this is of no importance, since, as it is employed soon after its preparation, these impurities in no degree prevent detonation.

II. *Properties of Nitroglycerine.*—Nitroglycerine is a yellow or brownish oil, heavier than water and insoluble in it, but soluble in ether, alcohol, &c.

Exposed to a prolonged but not intense amount of coldness, it crystallizes in long needles. A violent shock best causes it to detonate. The handling of it is now easy and only slightly dangerous. Spread upon the ground it is only with difficulty fired by a body in combustion, and then only burns partially; a flask containing nitroglycerine may be broken upon stones without its detonating; it may be volatilized without decomposition by a regulated heat; but if it boils, detonation becomes imminent.

A drop of nitroglycerine falling on a metal plate moderately heated volatilizes quietly. If the plate be red-hot, the drop is immediately fired and burns like a grain of powder, only noiselessly; but if the plate, without being red-hot, is hot enough to make the drop boil immediately, it decomposes suddenly with a violent detonation.

Nitroglycerine, especially when impure and acid, decomposes spontaneously after a certain time, with an escape of gas and the production of oxalic and glyceric acid.

Probably the spontaneous explosions of nitroglycerine, with whose disastrous effects the papers have acquainted us, are owing to the same cause. The nitroglycerine being enclosed in well-corked bottles, the gases produced by its spontaneous combustion cannot escape; they then exercise an immense pressure on the nitroglycerine, and in this state the least shock and the slightest movement will cause an explosion.

The flavor of nitroglycerine is at once sweet, piquant, and aromatic; it is poisonous, and taken in small doses it produces

bad headaches. Its vapor produces similar effects, and this reason might well prove an objection to its use in the subterranean galleries of mines, where its vapors cannot disperse as they do in open-air quarries.

Nitroglycerine is not, properly speaking, a nitrated body, such as nitro- or binitro-benzol, or mono- bi- and trinitro-phenisic acids. Indeed, under the influence of reducing bodies, such as nascent hydrogen, sulphuretted hydrogen, &c., the glycerine is set at liberty, and the caustic alkalies decompose the nitroglycerine into nitrates and glycerine.

III. *Modes of employing Nitroglycerine.*—Suppose the object is to detach a stratum of rocks. At 2.50 to 3 metres distance from the exterior border sink a mining hole about 5 or 6 centimetres in diameter and 2 or 3 metres in depth.

After having thoroughly cleared all mud, water and sand out of the hole, pour into it, through a funnel, from 1500 to 2000 grammes of nitroglycerine. Then immerse in it a little cylinder of wood, pasteboard, or tin, about four centimetres in diameter, and from five to six centimetres in height, and filled with ordinary powder. This cylinder is fixed to an ordinary mining fuse, which goes down a certain depth to insure the combustion of the powder. The cylinder is lowered by means of the wick or fuse; the moment the cylinder reaches the surface of the nitroglycerine may easily be known by the touch. When it touches the surface, hold it perfectly still, and pour sand into the hole until it is quite full; there is no need to compress or plug the sand. Cut the wick some centimetres from the orifice of the hole, and then set fire to it. In about eight or ten minutes the match burns down to the powder and fires it. Then ensues a violent shock, which immediately causes the detonation of the nitroglycerine. The explosion is so sudden that the sand is not even projected.

The whole mass of the rock rises, is displaced, then resettles without any projection; only a dull detonation is heard.

Only on examining the spot can an idea be formed of the power of the force developed by the explosion. Formidable masses of rock are slightly displaced and rent in every direction, and ready to be removed mechanically.

The chief advantage is that the stone is only slightly crushed, and there is very little waste.

In the manner we have shown, from 40 to 80 cubic metres of rock may be detached by charges of nitroglycerine.

We trust to have shown by this notice the possibility of reconciling the employment of nitroglycerine with every desirable guarantee for public safety.—*Lond. Chem. News*, Aug. 10, 1866, from *Comptes Rendus*, t. lxiii. p. 189.

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#### EXPERIMENTS ON THE ACTIVE PRINCIPLE OF HYOSCYAMUS.

BY WILLIAM A. TILDEN, F.C.S.

The plants of the Natural Order *Solanaceæ*, to which the *Hyoscyamus* belongs, present in general well-marked narcotic properties, and their active principles have, for the most part, been pretty completely studied. Henbane, however, seems to have been comparatively neglected, notwithstanding that it is in common and extensive use in the form of extract and tincture. It was on this account that I undertook some experiments upon the chemistry of this plant, hoping to have been able to establish the existence or non-existence of the alkaloid it was said to contain, and, if possible, to add to our existing knowledge by submitting the base itself and some of its compounds to analysis. The former is the only part of my original intention that hitherto I have been able to carry out. Either from the excessively minute quantity of the principle contained in the plant, or from its facility of decomposition when under the influence of chemical agents, I have been able to prepare at present a quantity only sufficient for its identification, and for making out some of its principal reactions.

I first of all attempted to prepare "hyoscyamine" by operating upon the seeds of *Hyoscyamus niger* by the process adopted by Geiger, and described in the fourth volume of Gerhardt's "Chimie Organique." In this manner, however, I obtained only equivocal results. I then made another experiment upon the seeds, employing the process recommended by Sonnenschein for the detection and elimination of organic bases. This process is

briefly as follows: The juice of the plant is collected, acidified with sulphuric acid, and heated to coagulate albuminous matter, or an extract is prepared by means of acidulated alcohol or water; by either plan a liquid is obtained, which is evaporated to a small bulk, allowed to stand, if necessary again filtered, and then mixed with excess of the acid mixture of phosphate and molybdate of sodium, for the preparation of which directions are given.

A precipitate is formed which contains the base in combination with the "phospho-molybdic" acid; it is collected, slightly washed, introduced still moist into a flask, and excess of caustic baryta added; a cork is then fitted, and heat applied. Should volatile bases be present, they are distilled into a set of bulbs containing dilute hydrochloric acid.

The non-volatile bases which remain are afterwards obtained by rendering the excess of baryta insoluble by a stream of carbonic acid, and then extracting with alcohol, which gives a solution of the base nearly in a state of purity. Here, again, I was unsuccessful, possibly because the hyoscyamine was altered by the caustic earth, with evolution of ammonia, a kind of change to which it is very subject.

I next procured a quantity of freshly-prepared extract of the leaf, which was kindly furnished me from one of the first pharmaceutical establishments in London. Half a pound of this extract (corresponding to about 14 lb. of the leaves) was dissolved in about three pints of water, mixed with a very small quantity of milk of lime, and filtered; to the clear liquid was then added carbonate of potash till it was strongly alkaline, and the whole thoroughly agitated with about a pint of chloroform. After standing all night, the chloroform subsided as a slightly greenish oil, which was separated by a funnel, filtered into a bottle, shaken up with some water acidulated with sulphuric acid, and then the chloroform recovered. This aqueous liquid gave an abundant precipitate with Sonnenschein's reagent; it was rendered alkaline with carbonate of potash, and shaken up with ether. The ethereal solution contained all the base, as was indicated by the fact that the aqueous portion, upon reacidification, no longer gave a precipitate with the phospho-molybdate. The ether, which was colorless, was then shaken up with acidulated water,

and the whole distilled in a water-bath. The acid solution remaining gave an abundant yellowish precipitate with Sonnen-schein's reagent; neutralized with bicarbonate of soda, a dirty white precipitate with tannin, soluble in acetic acid; a yellow flocculent precipitate with chloride of gold; a brown precipitate with solution of iodine in hydriodic acid; an orange-yellow precipitate with protochloride of iodine; no precipitate, however, was observable either with perchloride of platinum or with solution of corrosive sublimate.

The base itself is a substance very soluble in alcohol, ether, chloroform, and even in water. Its aqueous solution possesses a strong acrid and bitter taste, and when suffered to evaporate spontaneously over oil of vitriol, has been observed to crystallize in radiating groups of needles, though this is not always the case, and it is generally obtained as a colorless gummy mass. It has a slight odor quite different from that of the plant, and is very decidedly alkaline to test-paper. Caustic alkalies destroy it rapidly, especially on application of heat, the solution becoming brown, and an alkaline vapor, probably ammonia, being evolved. Several of the characters here described agree with those given by Geiger, and mentioned in the "Organic Chemistry" of Gerhardt.

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Mr. GROVES had made some experiments upon this alkaloid a few years since. His method of operation had differed from the author's. He boiled the leaves of hyoscyamus with olive-oil, and then agitated the product with hydrochloric acid and water. From this he obtained a small quantity of a liquid principle with alkaline properties, which he regarded as the active constituent of this drug.

Dr. ATTFIELD thought that after this statement we must recognize two principles as being present.

Mr. REYNOLDS suggested that the root should be used in future experiments.

Mr. SUTTON alluded to Professor Donovan's experiments as showing that the tincture of henbane was an inert preparation. He had swallowed it in doses of half an ounce without finding any inconvenience.



The PRESIDENT remarked that the physiological question could not be followed far in that room, from its merging into considerations that were more within the province of the physician.

Mr. DEANE gave it as his opinion that the sedative effects of even small doses of henbane were beyond doubt in many cases, and he could not help thinking that some peculiar circumstances must have influenced the cases in which very large doses had been taken with impunity.

Mr. CARTEIGHE had made some preliminary experiments on the active principle of henbane, and as far as they went they confirmed Mr. Tilden's results.—*London Pharm. Jour.*, Sept., 1866.

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#### OBTAINING SPIRITS, &c., FROM WOOD.

Letters patent to William Edward Newton, sealed February 6, 1866, and dated August 31, 1865.

This invention consists in obtaining spirits of turpentine, rosin, tar, pitch, pyroligneous acid, gas, charcoal and wood naphtha, directly from pine wood by one operation.

The wood containing the resinous gum (pitch pine wood) is placed in iron retorts, which are closed up steam tight, and a stream of steam is let into the retort, which may at the same time be heated externally to expedite the process. As soon as the condensation of the steam ceases or partially ceases, the pressure of steam in the retort rapidly forces the heat through the mass of wood until the heat reaches from 300° to 320° F., when the valve which connects the retort with a condenser is opened, and the vapors containing water and spirits of turpentine pass over into the condenser and are condensed, the spirits rising on to the top of the water. This process continues several hours, the heat being gradually raised until the wood begins to char and forms acid, gas, and other products, at which time a large portion of the turpentine spirits have passed through the condenser. This process is hastened, and the yield of spirits in this part of the operation much increased, by reducing the pressure of the vapors in the retort to two or three pounds per square inch by the aid of air pumps and condensers, or otherwise. When the pressure is thus mainly removed, the evapora-

tion is so rapid that without the use of superheated steam it is difficult to keep up sufficient heat without charring the wood in some parts, which must be avoided as long as possible, as the quality of the spirits is very poor after charring commences until they have passed through difficult processes of refining. While this process is going on rosin is formed and runs down to the bottom of the retort, and is drawn out before the charring commences.

In using the vacuum or partial vacuum in the distillation, it will be found advantageous to shut off the connections of pump and condensers with the retort occasionally, to allow pressure of steam in the retort, which rapidly forces the heat through the wood again without charring it, unless the temperature of the steam is too high. The pressure of steam in the retort is not generally allowed to reach more than three or four atmospheres before it is again reduced. As soon as the yield of the spirits of turpentine becomes inconsiderable, the heat is raised and the charring commences, and as soon as this progresses rapidly, the steam may be nearly or quite shut off, and the acid formed will be much stronger than if the supply of steam be kept up during the entire distillation. The use of the vacuum or partial vacuum may be resorted to frequently throughout the entire distillation, the products coming over purer and at a much lower heat than they otherwise would. While the charring of the wood takes place, the vapors passing off consist of acid, wood naphtha, spirits, oil, tar, incondensable vapors, &c. A very advantageous way of separating the tar from the other vapors is to surround the condenser with a bath, heated to such a degree as to enable the vapors of the naphtha, acid, and spirits, together with the light oils, to pass through it without condensation, but cool enough to condense the tar, and so placed that the tar will run back into the retort while the vapors of the acid, naphtha, spirits, &c., pass on through another condenser, which may be cold, and separate the gas from the other products, or it may be heated sufficiently to carry the wood naphtha over with the gas into another condenser, where it is finally separated from the gas. The distillation is continued until the wood is thoroughly charred and the tar converted into a beautiful black lustrous pitch, the

oils being nearly driven therefrom. Should the rosin be left in the retort, it will also be converted into pitch. Care should be used not to heat the retort too highly on the bottom, as the pitch will be destroyed, if heated too much, by turning it into coke. It should be watched and drawn out as soon as sufficiently hard, whatever be the heat of the retort bottom. Should neither steam nor superheated steam be used in the distillation, the retort should be closed tightly at first, and the steam formed from the water of the wood, and the other vapors, aid in increasing the pressure of vapors in the retort, and thus more equally distribute the heat through the wood. When the pressure in the retort reaches two or three atmospheres, the valve to the condenser may be opened.

Much more caution will have to be used to heat gradually and drive off most of the spirits before charring commences, if steam or superheated steam be not used to aid in heating the wood; these will be necessary if they are used.—*Lond. Chem. News*, Aug. 3, 1866.

#### ON VALERIANATE OF IRON.

By FRANCIS SUTTON, F.C.S., Norwich.

More than two years have passed since I accepted the subject of Valerianates for investigation, but owing to pressure of other business matters I have been until now unable to present any report thereon. That which I now have the honor to present to the Conference is not nearly so complete as I could wish.

With respect to valerianate of iron, the question proposed was—

What is the best process for the preparation of the salt? What are its characters? How may its purity be best ascertained?

We will first take into consideration the characteristics of the salt as described by previous authorities.

Pereira says, "Valerianate of iron, prepared according to the Dublin College, is a tile-red loose amorphous powder, with a faint odor and taste of valerianic acid. When heated it first fuses, then evolves its acid, and is converted into sesquioxide of iron. At a temperature of  $212^{\circ}$  it gives out part of its acid; it is

nearly insoluble in water, does not mix well with cold water, but repels it like lycopodium, and boiling water gradually extracts the acid from it. It dissolves in alcohol and acids."

Wittstein, who seems to have given some attention to the subject, says: "The valerianate of peroxide of iron obtained by precipitation is a dark brick-red loose amorphous powder, smelling and tasting faintly of valerianic acid; it will not mix with cold water even when rubbed continuously with it, but is instantly wetted by warm water, and gives up a portion of its acid to it." The same authority says: "The affinity between the oxide of iron and valerianic acid is so feeble that a gentle heat will suffice to abstract the greater portion of the acid, consequently the precipitation should only take place in the cold. Even continued treatment with cold water gradually abstracts the acid, and at the same time removes a little of the oxide of iron, so that the precipitate must not be washed as long as the water passing off has an acid reaction."

The descriptions of the salt here given agree pretty closely with the preparation as met with in commerce, with the exception of the solubility in alcohol. Although I have examined about a dozen specimens procured from various houses in London, and some in the provinces, I have found none, with the exception of a specimen sent me by an esteemed member of this Conference, Mr. Daniel Hanbury, which would dissolve in any appreciable proportion in alcohol.

The bulk of the samples examined consisted mainly of peroxide of iron, with small quantities of valerianic acid in the compound. No two preparations were precisely alike in composition, owing no doubt to the fact that as prepared in the way usually directed, and dried by artificial heat, the loss of valerianic acid was considerable.

The specimen sent me by Mr. Hanbury was in the form of a soft extract, smelling very strongly of valerianic acid, and of a transparent ruby color,—agreeing, in fact, precisely with a specimen I had myself prepared some months previously, but had not been able, owing to business engagements, to investigate. It is best, perhaps, here to say that when following the usual directions for preparing the salt, I had invariably obtained the brick-red powder described by Pereira and Wittstein.

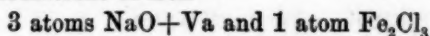
About three weeks ago I resolved to make a closer examination of these two preparations of valerianate of iron, namely, Mr. Hanbury's and my own, in order to see wherein they differed from the powdery kind usually found in the market. As they were both found to be identical in composition eventually, the description of one of them will suffice. I will describe the sample sent by Mr. Hanbury.

A small quantity of it was spread out thinly upon the lid of a platinum basin and weighed. The quantity was 13.42 grains; the first thing to be done with it was to remove any excess of moisture in the compound. Fearing that heat might dissipate some of the valerianic acid, the vessel was placed under the receiver of a large air-pump, together with a dish of sulphuric acid, and kept in vacuo for twenty-four hours, when the loss was found to be 2.7 grains, equal to 20 per cent. It was then exposed to the same influences twelve hours longer, but with no further loss. In order to ascertain whether any acid would be lost by artificial heat, it was then transferred to a water-bath, and kept at a temperature of  $212^{\circ}$  until the weight remained constant; the loss was then 3.41 grains, or very nearly 25 per cent., but no change had taken place in the appearance of the substance, and no apparent loss of acid by smell or otherwise. It had now lost all stickiness and become quite firm, so that it might readily be chipped off the vessel in thin transparent scales, like the usual citrate or tartrate of iron. A few of these scales were treated with alcohol, and were found to dissolve readily to a clear deep ruby liquid, but they were quite insoluble in water, and if water is added to the alcoholic solution the valerianate is immediately precipitated.

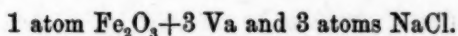
A quantity of the dry scales, weighing 9.1 grains, were then gently heated over a gas lamp, when they immediately began to melt, and give off copious fumes of valerianic acid, which readily ignited and gave a yellow brilliant flame. The residue, which appeared to consist of oxide of iron, weighed 2.31 grains; this was dissolved in a little hydrochloric acid, and the oxide of iron precipitated with ammonia. The weight of precipitate so obtained was 2.03 grains; the loss of weight between this and the ignited residue was due to sulphate of soda not thoroughly washed out of the valerianate.



I had no time to ascertain the quantity of valerianic acid actually present in the salt; but assuming that the loss from ignition was due to this acid alone, the formula of the salt would be as near as possible  $\text{Fe}_2\text{O}_3 + 3 \text{Va}$ , or a neutral anhydrous valerianate of peroxide of iron, containing three equivalents of valerianic acid = 279, and one equivalent of oxide of iron = 80; and this is the formula given by Wittstein, but which he says he was not able to produce, his explanation being as follows: "If a neutral solution of valerianate of soda is added to one of perchloride or any persalt of iron, a dark brick-red precipitate of valerianate of iron is formed, together with a sulphate or chloride of sodium, according to whichever iron salt has been used. In the case of perchloride of iron—



form



The neutral compound of valerianic acid described above does not, however, precipitate," he goes on to say, "but decomposes as soon as formed into a basic salt, in which, if the formula of the neutral salt is tripled, two atoms of acid are replaced by two atoms of water, forming a salt  $3 \text{Fe}_2\text{O}_3 + 7 \text{Va} + 2 \text{HO}$  and free valerianic acid, which, holding a portion of the basic salt in solution, gives to the supernatant liquor a slightly yellowish-red color." This basic salt is therefore the substance generally found in commerce, and I suppose is the only valerianate of iron which it has been hitherto thought could be obtained. The neutral valerianate is in ruby scales, will dissolve in its own weight of alcohol, and will bear heating to a temperature of  $212^\circ$  without decomposition. Not only in these respects but in appearance it differs completely from the brick-red powder hitherto known to us, and I doubt not will be found a much more reliable article for medicinal use.

The next question for our consideration is the preparation of the salt, and herein seems to lie the secret of the difference between one salt and the other. My experiments in this matter have not been so extensive as I could wish, but so far as they go they seem to show that the use of dilute solutions of valerianate of soda and iron necessitate the production of the basic salt, and *vice versa*,

with concentrated solutions. Another thing is of great importance, namely, that the valerianate of soda used should be entirely free from carbonate or caustic soda, a thing of rare occurrence with the usual commercial article apparently, more especially the carbonate; this may be known at once by its solution effervescing with an acid. If the valerianate of soda is contaminated in this way, the result obtained is unsatisfactory, owing to the admixture of hydrated oxide of iron.

Mr. Hanbury, in writing to me respecting the preparation of the salt, says; "We prepare it by decomposing a strong solution of persulphate of iron by one of valerianate of soda. Upon mixing the solutions a copious precipitate of an extractiform substance of a brick-red color is formed, with which is mixed a considerable quantity of sulphate of soda in small crystals. The precipitate is easily washed by kneading it in distilled water until the latter almost ceases to be affected by a solution of baryta. The resulting product requires no drying beyond the pouring off, as far as possible, of the water which somewhat gradually exudes from the mass; it remains in the form of a soft extract, which becomes harder after some months. We never attempt to dry it."

The method I have adopted myself in preparing the specimen now before you is, to take any convenient quantity of valerianic acid which is to be exactly saturated with a concentrated solution of carbonate of soda, heating the mixture in a water-bath so as to dispel all the carbonic acid; the fluid is then suffered to cool and into it is poured, as long as any precipitate is produced, the liquor ferri persulphas of the British Pharmacopœia,—about the same quantity by measure is required of the iron solution as has been used of valerianic acid; after some little mixing with a glass rod the precipitate settles down into a semi-fluid extract, which may be repeatedly washed with distilled water by a sort of kneading process, until the sulphate of soda is entirely removed; it is then spread out as thinly as possible upon glass or porcelain plates, and suffered to dry either by simple exposure to the air or by a gentle heat, then chipped off and preserved in bottles. The salt so obtained is not in the slightest degree deliquescent.

The best test of its purity is its complete insolubility in water and the ease with which it dissolves in spirit of wine.

*Valerianate of Zinc.*

The question proposed for solution in the list of subjects now under the notice of the Conference in connection with this substance is : Describe an easy method of determining the purity of valerianate of zinc as found in commerce ? In answer to this, I wish to say that I have not had time to carry out any great number of experiments on the subject, but I find that pure valerianate of zinc dissolves readily in a dilute solution of citric or tartaric acid, without separation of the valerianic acid, as is the case when sulphuric or hydrochloric acid are used. Oxide of zinc is insoluble in dilute vegetable acids, so that supposing a sample were tested which had been made by rubbing up valerianic acid with oxide of zinc, the specimen would remain insoluble. If acetate of zinc had been used as a substitute, this would dissolve, but it would also dissolve in water. Therefore, if a specimen is tested and found to be insoluble in water but dissolves pretty readily in a cold weak solution of citric or tartaric acid, we may infer that the preparation is pure.—*London Pharm. Jour.*, Sept., 1866.

## DENTIFRICES.

BY DR. C. E. FRANCIS.

Read before the Brooklyn Dental Association, April 4th, 1866.

From *dens*, a tooth, and *fricaro*, to rub.

This term is applied to preparations used for cleaning the teeth and tending to their preservation. Numberless preparations under the name of dentrifices have been spread before the public, and numerous have been the substances employed in their manufacture.

Nearly every pharmacist in the land has from one to a dozen preparations for the teeth to offer his customers, and every vender of cosmetics has some favorite nostrum to recommend. They are in the form of *powders*, *pastes*, *soaps* and *lotions*. Many of these preparations are undoubtedly of benefit to those who are in the habit of using them, and many of them perhaps do more mischief than good. How long a period dentrifices have been in use, I am not able to say, but we find formulas for tooth-

powder in very antiquated works. Like most of the old order of prescriptions, these at the present time look somewhat absurd. Many of you probably have noticed an old formula quoted by Goddard in his "History of the Teeth." For the benefit of those who have not seen it, I will repeat it; so if anybody present desires to copy for future use, he can now have the opportunity of doing so. It reads thus:

"Take the head of a hare and three mice; burn and reduce them to powder, and mix with an equal weight of powdered marble." Here, says Goddard, you have animal charcoal and prepared chalk with a vengeance. This prescription is said to be over two thousand years old, and is claimed as having originated in the fertile brain of old father Hippocrates. There are many prescriptions of more modern date which seem equally ridiculous. Even in Harris' works we find a curious compound known as "Beaumer's Dentifrice." It is this: Take of powdered pumice-stone, red earth, and prepared coral, *aa*  $\bar{z}i$ ; dragon's blood and cream of tartar, *aa*  $\bar{z}ss$ ; powdered cinnamon,  $\bar{z}ij$ ; cloves, grs. xxv. M. The same author also gives us a formula for what he terms an *aromatic* powder, composed of Peruvian bark, powdered galls, chalk, and orris root, in nearly equal proportions. I imagine the galls and Peruvian bark a decidedly aromatic preparation, well calculated to tempt children to use freely. I will quote one other from Harris, called "Lelande's Electuary Dentifrice." Take of pumice-stone, dried bones, and red coral, *aa*  $\bar{z}ij$ ; calcined alum, orris root, and powdered cinnamon, *aa*  $\bar{z}ij$ ; rock alum and cochineal, *aa*  $\bar{z}i$ . Add to this abomination a sufficient quantity of Narbonne honey to make a thin paste. Allow it to ferment forty-eight hours, and flavor with tincture of musk and cloves. Goddard gives a formula from Prof. Hufeland: Peruvian bark,  $\bar{z}i$ ; red sanders,  $\bar{z}iv$ ; and alum,  $\bar{z}i$ . Flavor with oil of lemon.

A deterative powder from the celebrated Maury reads thus: Magnesia carb., *lbi*; cream tartar, *lbi*; sulph. quinia,  $\bar{z}v$ ; cochineal,  $\bar{z}iss$ ; ol. pip. m.,  $\bar{z}iv$ ; oil cinnamon,  $\bar{z}ij$ ; neroli,  $\bar{z}ij$ . M.

A "Polish Dentifrice" contains ammon. mur., powdered catechu, myrrh, Peruvian bark, and orris root. This would be

so agreeable to the taste that I would advise you all to import a quantity at once. I might give you prescriptions for dozens upon dozens of dentifrices that have been recommended by as many different individuals who have prepared them, did I think you would be benefitted by such a rehearsal. It may not be amiss, however, to give a list of the various substances which enter into their combination. I will name them alphabetically: alum, bole Armen., ashes of tobacco, ammonia mur., borax, bone dust, bark, red, pale, and yellow, Quillia bark, bismuth, benzine, chalk, charcoal, cuttle fish, camphor, catechu, cochineal, carmine, cardamoms, cinnamon, cloves, cream of tartar, coral, dragon's blood, galls, gaultheria, guaiac, honey, krameria, kino, lime, magnesia, myrrh, orris root, oyster shell, pellitory, pumice-stone, soap, white and Castile, soda, salt, sugar, red sanders, red earth, rose pink, tannin.

Some of these substances are but seldom used, and many others are of little account. The most popular substances, or those in common use for powder, are orris root, yellow bark, gum myrrh, chalk, and soap. These few articles, combined in various proportions, probably form the substance of at least two-thirds of all the tooth-powder used.

Tooth pastes are usually composed of orris root, pumice, chalk, etc., combined with honey. A once famous, but repulsive looking compound, was charcoal and honey; and it worked wonders in its own peculiar way, as we shall presently see. The most popular lotions are of the saponaceous order and highly flavored. The old order of mouth-washes were generally composed of tincture of myrrh, bark, camphor, etc. The everlasting sozodont, which is advertised on every fence and rock for fifty miles around us, is supposed to be an aromatic tincture of Quillia saponaria, or soap bark, from an evergreen tree growing in Chili. Of course I cannot say positively that it is such. However, a very nice lotion may be prepared from this bark; but just allow me to say at this point that pure, sweet *soap* is fully equal to any *fluid* preparation that has ever been prepared for cleansing the teeth. But soap alone is not all that we desire. It has not sufficient body for a perfect dentifrice. The same may be said of all fluid preparations.



In forming a dentifrice we have several things to consider. Admitting that some preparation of this sort is required, let us see what will best subserve our purpose and present the least number of objections. In the first place, tooth-powder should be pleasant to the taste, that it may be used freely by both old and young. It should also be as nearly *soluble* as possible. I contend that charcoal, pumice-stone, cuttle fish, and similar substances are unfit for common use. The harsh, insoluble particles are forced between the teeth and beneath the margin of the gums, forming a base for the deposit of salivary calculus, which as it concretes severs the membranous connection. The gums are thus kept in an irritated condition; the alveolar process becomes exposed to the action of destructive agents, consequently absorption takes place; the teeth loosen and fall out. I have known cases where particles of charcoal have remained imbedded beneath the surface of the gums for upwards of five years after its use had been abandoned. So much for gritty substances.

Now, as regards Peruvian bark and gum of myrrh. They are less objectionable, but I think their properties in this connection much over-rated. We do not need them in tooth-powder. They are unpleasant to the taste, bitter. Being insoluble in water, you get little or no medicinal effect; and where a medicinal preparation is desired, have a suitable wash prepared, adapted to the particular case, to be used in connection or alternately with the powder.

The best *base* for tooth-powder is pure precipitated chalk. It is entirely soluble in acetic acid. Borax is one of the very best of ingredients to combine with it. It tends to allay irritation of the mucous membrane, and imparts a peculiar sweetness to the mouth.

A simple and very excellent dentifrice may be made of prepared chalk and old white Windsor soap finely powdered, about six parts of the former to one of the latter. My own favorite dentifrice, which I both use and recommend, is simple and pleasant to the taste, and seems to answer every purpose that can be expected of a dentifrice for every-day use. It is this: R creta preparata, lbsiij; powdered borax and orris root, lbi; cardamom seeds, ʒij; white sugar, lbi. Mix. Flavor with either

ol. rose, ol. gaulth., neroli, or jasmine. This of course is a mere matter of taste. If color is desired, one pound of rose pink may be added, and as much less of the chalk used. Tooth-powder should be thoroughly triturated in a wedgewood mortar, and finely bolted. The objects of its preparation and use are, to keep the teeth perfectly clean, to neutralize any fermented matter secreted in the interstices, to allay irritation of the gums, and to correct fetid breath. It should be used sufficiently often to keep the mouth in good condition, even though it be once or twice a day. Prepared in a simple manner no fears need be entertained that the teeth will wear out from its frequent use. As it dissolves readily, it must of course be used as dry as possible, and will keep best in well-stopped glass jars. That there is a necessity for a good and suitable dentifrice (in this present generation) to assist in the preservation of human teeth, very few close observers will deny. My own observation has led me to believe that scarcely any person can have a clean mouth without its use. I know that it is argued by those who differ from me in this respect, that horses, sheep, and cattle do not require the use of a dentifrice to keep their teeth from decay or to insure them a sweet breath. This argument, so far as it goes, is very good, but it does not answer in our case. Horses and sheep do not live on hot mixed food as do their more enlightened masters, neither did their progenitors crave such unnatural diet. They also possess by inheritance a good sound set of masticators, and if they could follow out their own natural inclinations would so live as to keep their teeth and whole physical organization in a state of perfect health.

Do you not suppose that if our domestic animals, and their progenitors for a thousand years back, had been compelled to resort to the same sort of diet that we and our ancestors have so long indulged in, that they would also be cursed with rotten teeth and foul breaths? Examine the teeth of a poor cow that has been fed on hot distillery slops for even a few short years, you will find a very different mouth from that possessed by an animal who takes the cool, fresh grass from a country meadow. Look into the mouths of the many little children who daily enter our offices, and what do we behold? Children at ten, six, or even

three years of age; their little "pearly gems" appear more like a miniature array of mouldering tomb-stones, dilapidated, jagged, and broken; frequently emitting an odor so foul as to compel one to stand at a respectable distance while viewing the ruins. Look also into the mouth of an adult who pays no attention to the cleanliness of his teeth; notice the discolored remnants of a once perfect set of dentures; see the huge scales of calcareous deposit encircling the necks of the teeth, or nearly investing their entire crowns; observe the tumid condition of the gums, and how the filthy calculus has forced them to recede, and it is no wonder they recede at the approach of such an offensive accumulation. I do not say that the use of a tooth-brush and dentifrice will positively insure the teeth against decay, but a habitual cleansing process will greatly prolong their existence. I have heard it asserted that teeth are *worn out* by being cleansed. Even were this so, they had better wear out than rust out, or, as the old saying reads, "die clean if you will not live clean." But this is not apt to be the case. I have seen but a very few persons in my whole life whom I could conceive had injured their teeth by too much brushing, but have seen hundreds upon hundreds whose teeth were going to utter destruction from lack of care and tidiness. I do not believe in straining at the gnat and swallowing the camel. *Cleanliness, gentlemen, cleanliness* is next to godliness. Teeth should be brushed night and morning, particularly at night, for it is during the night that teeth are most ready to decay. During the day, the movements of the tongue, the fresh secretions of saliva, and the act of mastication, all tend, in a measure, to preserve the teeth; but during the night, little or no saliva is secreted, and particles of food filling their interstices being so long subjected to a moist and heated condition, rapidly ferment, and the fluids of the mouth are thus vitiated, inducing disease and decay.—*Dental Cosmos, Philada., Aug., 1866.*

#### THE MANUFACTURE AND PROPERTIES OF ANILINE COLORS, AND THE BODIES USED IN THEIR PREPARATION.\*

Memoir presented to the Société Industrielle de Mulhouse at the meeting of May 31, 1865.

By MM. DEPOULLY, Brothers.

##### 1. *Oils used in making Commercial Aniline.*—The source

which furnishes oils containing benzol and toluol is coal tar, which is produced in making coal gas.

In the distillation of these tars the first product is an oil lighter than water, commercially called "light oil," and containing—

1st. Neutral liquid hydrocarbides, benzol, toluol, cumol, &c., and a little solid hydrocarbide naphthaline.

2d. Phenols, bodies holding at the same time both alcohols and acids, phenic and cresylic acids.

3d. Very small quantities of alkaloids, aniline, picoline, quinoline.

To extract from these oils the principles used in making aniline colors, it is first necessary to separate the phenols; this result is obtained by agitating the oils with small quantities of caustic soda at 40° Baumé, or even more concentrated. If we separate the watery layer containing the phenols in combination with soda, this operation twice repeated completely frees the oils from phenols.

Sometimes, before this operation, the alkaloids are removed from the oils by being rapidly agitated with a small proportion of sulphuric acid.

These washings should be terminated before new rectifications are commenced, for the naphthaline separates much more readily by a redistillation when neutral oils are operated upon.

It then merely remains to separate the benzol and toluol from their homologues, the other liquid hydrocarbides.

We generally operate by fractional distillation—that is to say, by collecting all that is distilled between 80° and 120°, and this portion is sold under the name of benzol, and serves in the making of aniline.

Benzol is usually sold with a standard of distillation fixed beforehand, either at 90 per cent. or 60 per cent.—that is to say, 90 or 60 per cent. distilling below 100° C.

During the last few years benzol at 90 per cent. has been most in demand, but it has lately been found that aniline made with benzol at 60° gives the greatest yield of coloring matters.

These benzols are composed almost exclusively of two bodies—benzine and toluol.

Benzine,  $C_{12}H_6$ , distils at 80°; treated by nitric acid it gives

nitrobenzine  $C_{12}H_5NO_2$ , distilling at  $213^\circ$ , which by reducing agents gives aniline  $C_{12}H_7N$ , distilling at  $182^\circ$ .

Toluol,  $C_{14}H_9$ , distills at  $114^\circ$ ; by nitric acid it gives nitrotoluol,  $C_{14}H_7NO_2$ , which forms toluidine,  $C_{14}H_9N$ , distilling at  $198^\circ$ .

In this series of homologous hydrocarbides, benzol, toluol, xylol, cumol, cymol, the densities diminish in proportion as the equivalent and the boiling-point rise; and this law holds not only for hydrocarbides, but for their nitrogenized derivatives, for the alkaloids derived from them, and also for the corresponding phenols.

Thus a hydrocarbide distilling at  $80^\circ$  will have a density of 0.885; of another, distilling at  $110^\circ$  or  $114^\circ$ , the density will be only 0.870.

The density of a nitrobenzol distilling at  $213^\circ$  to  $220^\circ$  would be 1.200 to 1.210, while that of a nitrotoluol distilling at  $220^\circ$  to  $230^\circ$  would be 1.180 to 1.190.

Pure aniline,  $C_{12}H_7N$ , distilling at  $182^\circ$ , would have a density of 1.028; pure toluidine,  $C_{14}H_9N$ , distilling at  $198^\circ$ , would have a density of 1.001 to 1.002.

Phenic phenol,  $C_{12}H_6O_2$ , is denser than cresylic phenol,  $C_{14}H_8O_2$ .

Neither pure aniline nor pure toluidine produces coloring matter.

The best results, both as to beauty and quantity, and with both red and violet, have been obtained with a mixture of 70 per cent. of toluidine and 30 per cent. of aniline—that is to say, 2 equivalents of the one, and 1 equivalent of the other. These proportions agree perfectly with the formula ascribed by Dr. Hofmann to rosaniline. The object in view is then to obtain a commercial aniline thus composed.

The fractional distillation of commercial aniline for this purpose is a difficult operation. The distillation of nitrobenzol is not only dangerous, but expensive. It is better to endeavor to separate the hydrocarbides serving for the fabrication of aniline. Though this is not the usual operation, it appears to us the only rational one if aniline with an unvarying composition is desired.

The first method of separating hydrocarbides is due to Mansfield, who, in 1848 and 1849, produced the hydrocarbides of coal-tar and their derivatives, and indicated a great many applica-



tions for them. This work cost him his life. Proposing to separate benzol from the light coal oils, Mansfield heated these oils in a still with the head kept surrounded with water. The vapors ascending into the head became condensed, and fell back into the still; and after a time the water surrounding the head, not being renewed, was heated to the boiling-point. From the time the water in the open jacket reaches a temperature of  $80^{\circ}$  the benzole no longer condenses, but passes on into the worm, while the other oils fall back into the still. When the water arrives at the boiling point, only benzole passes over; after a time nothing passes, and all the benzole is separated.

This complete separation is founded on the boiling-point of water, intermediate between that of benzol,  $80^{\circ}$ , and that of toluol,  $114^{\circ}$ .

Mansfield tried to separate only benzol. The operation might easily be modified so as to separate toluol in a similar manner; it would suffice, the benzol once separated, to replace the water by some liquid—a saline solution, for instance—maintained at a constant level, and with a boiling-point intermediate between that of toluol and that of xylol.

Mansfield also tried to separate benzol with the apparatus used for the rectification of alcohol. Several patents have been taken out with the same idea, amongst which we will mention only M. Ch. Coupier's, who has effected the separation of benzol and toluol by means of an ingenious apparatus patented by him. We have seen various products from his works at Poissy, consisting of pure benzol and aniline, and nearly pure toluol and toluidine.

Some researches, for the purpose of previously separating the oils of coal-tar in an exact and economical manner, are much required, and would lead to great progress in the fabrication of aniline colors.

Another reason for insisting on this point is the considerable difference in the manner in which toluol and benzol behave with regard to nitric acid, when it is desired to transform them into nitrobenzol.

Toluol is attacked with greater difficulty; mixtures of sulphuric and nitric acids must be modified before treating this body.

In this series, in proportion as the equivalent is raised, the

action of nitric acid becomes more violent, especially more oxidizing, more destructive, forming nitrogenized bodies more easily; indeed, great precautions are necessary in obtaining nitrogenized derivatives from the higher hydrocarbides.

Here, then, is a cause of loss, and of the formation of secondary products. In a mixture of benzol with other oils there is a risk of destroying a part of these oils or of leaving part of the benzol unattacked.

Moreover, is toluol a perfect homologue of benzol? The action of chlorine on these two bodies is not the same; with benzol it produces chlorides without eliminating hydrogen; with toluol it produces chlorinated toluols, the chlorine substituting itself for one or more atoms of hydrogen.—*Chemical News*, August, 1866.

To be continued.

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#### DEPARTMENT OF THE MOST IMPORTANT MEDICINAL ALKALOIDS WITH REAGENTS, AND A SYSTEMATIC METHOD OF EFFECTING THE DETECTION OF THESE SUBSTANCES.

(FROM PROF. C. R. FREZENIUS' Manual of Qualitative Analysis.)

NOTE.—In commencing the reprinting of the article on the department of alkaloids, at page 447 of our September number, published by Prof. A. Wadgymer, of St. Louis, in the *Medical Reporter* of St. Louis, (April and May, '66), we, as well as others, believe it to be, as it purports to be, an original article, properly to be credited to Prof. Wadgymer; but we find that it is almost wholly a plagiarism from Dr. C. R. Frezenius' Manual of Chemical Analysis. Compared with the recent American edition of Frezenius', we find a few paragraphs and foot-notes omitted, due probably to the use of the 7th instead of the 11th, or latest German edition. Prof. Wadgymer also omits the chapter on the volatile alkaloids, which may not have been contained in the earlier edition of Frezenius. Under these circumstances we feel best satisfied to credit the continuation of the article to Prof. C. R. Frezenius, and take it from the last American Edition of Prof. Johnson, of Yale.—ED. AMER. JOURN. PHARM.

*Third Group.*—Non-volatile alkaloids which are precipitated by potassa from the solutions of their salts, and do not redissolve to a perceptible extent in an excess of the precipitant; but are not precipitated from (even somewhat concentrated) acid solutions by the bicarbonates of the fixed alkalies; Strychnia, Brucia, Veratria.

a. STRYCHNIA, or STRYCHNINE ( $C_{22}H_{22}N_2O_4 = Sr.$ )

1. Strychnia appears either in the form of white brilliant rhombic prisms, or, when produced by precipitation or rapid evaporation, as a white powder. It has an exceedingly bitter taste. It is nearly insoluble in cold, and barely soluble in hot water. It is almost insoluble in absolute alcohol and ether, and only sparingly soluble in dilute spirit of wine. It dissolves freely in amyl-alcohol, more especially with the aid of heat. It does not fuse when heated. It is exceedingly poisonous.

2. Strychnia neutralizes acids completely. The salts of strychnia are, for the most part, crystallizable; they are soluble in water. All the salts of strychnia have an intolerably bitter taste and are exceedingly poisonous.

3. *Potassa* and *carbonate of soda* produce in solutions of salts of strychnia white precipitates of STRYCHNIA, which are insoluble in an excess of the precipitants. Viewed under a microscope magnifying one hundred times the precipitate appears as an aggregate of small crystalline needles. From dilute solutions the strychnia separates only after the lapse of some time, in the form of crystalline needles, which are distinctly visible even to the naked eye.

4. *Ammonia* produces the same precipitate as potassa. The precipitate redissolves in an excess of ammonia; but after a short time—or if the solution is highly dilute, after a more considerable lapse of time—the strychnia crystallizes from the ammoniacal solution in the form of needles, which are distinctly visible to the naked eye.

5. *Bicarbonate of soda* produces in neutral solutions of salts of strychnia a precipitate of strychnia, which separates in fine needles shortly after the addition of the reagent, and is insoluble in an excess of the precipitant. But upon adding one drop of acid (so as to leave the fluid still alkaline) the precipitate dissolves readily in the liberated carbonic acid. The addition of bicarbonate of soda to an acid solution of strychnia causes no precipitation, and it is only after the lapse of twenty-four hours, or even a longer period, that strychnia crystallizes from the fluid in distinct prisms, in proportion as the free carbonic acid escapes. If a concentrated solution of strychnia, supersaturated

with bicarbonate of soda, is boiled for some time, a precipitate forms at once; from dilute solutions this precipitate separates only after concentration.

6. *Sulphocyanide of potassium* produces in concentrated solutions of salts of strychnia immediately, in dilute solutions after the lapse of some time, a white crystalline precipitate, which appears under the microscope as an aggregate of flat needles, truncated or pointed at an acute angle, and is but little soluble in an excess of the precipitant.

7. *Chloride of mercury* produces in solutions of salts of strychnia a white precipitate, which changes after some time to crystalline needles, aggregated into stars, and distinctly visible through a lens. Upon heating the fluid these crystals redissolve, and upon subsequent cooling of the solution the double compound recrystallizes in larger needles.

8. If a few drops of pure *concentrated sulphuric acid* are added to a little strychnia in a porcelain dish, solution ensues, without coloration of the fluid. If small quantities of oxidizing agents (chromate of potassa, permanganate of potassa, ferricyanide of potassium, peroxide of lead, binoxide of manganese) are now added—best in the solid form, as dilution is prejudicial to the reaction—the fluid acquires a magnificent blue-violet color, which, after some time, changes to wine-red, then to reddish-yellow. With chromate of potassa and permanganate of potassa the reaction is immediate; on inclining the dish, blue violet streaks are seen to flow from the salt fragment, and by pushing the latter about, the coloration is soon imparted to the entire fluid. With ferricyanide of potassium the reaction is less rapid; but it is slowest with peroxides. The more speedy the manifestation of the reaction the more rapid is also the change of color from one tint to another. I prefer chromate of potassa, recommended by Otto, or permanganate of potassa, recommended by Guy, as the most sensitive, to all other oxidizing agents. Jordan succeeded, with chromate of potassa, in distinctly showing the presence of  $\frac{1}{100000}$ th grain of strychnia. J. Erdmann prefers binoxide of manganese in lentil-sized fragments. Metallic chlorides and considerable quantities of nitrates, also large quantities of organic substances, prevent the manifestation of

the reaction or impair its delicacy. It is therefore always advisable to free the strychnia first, as far as practicable, from all foreign matters before proceeding to try this reaction. If the solution colored red (by binoxide of manganese) is mixed with from four to six times its volume of water, and ammonia is then added until the reaction is *nearly* neutral, the fluid shows a magnificent violet-purple tint; upon addition of more ammonia the color becomes yellowish-green to yellow, (J. Erdmann.) I have found, however, that this reaction is seen only where larger, though still very minute, quantities of strychnia are present.

9. Strong *chlorine water* produces in solutions of salts of strychnia a white precipitate, which dissolves in ammonia to a colorless fluid.

10. *Concentrated nitric acid* dissolves strychnia and its salts to a colorless fluid, which turns yellow upon the application of heat.

b. BRUCIA, or BRUCINE ( $C_{45}H_{28}N_2O_8 = Br.$ )

1. Crystallized brucia ( $Br. + 8 aq.$ ) appears either in the form of transparent right rhombic prisms, or in that of crystalline needles aggregated into stars, or as a white powder composed of minute crystalline scales. Brucia is difficultly soluble in cold, but somewhat more readily in hot water. It dissolves freely in alcohol, both in absolute and dilute, also in cold, but more readily still in hot, amyl-alcohol; but it is almost insoluble in ether. Its taste is intensely bitter. When heated, it fuses with loss of its water of crystallization.

2. Brucia neutralizes acids completely. The salts of brucia are readily soluble in water, and of an intensely bitter taste. Most of them are crystallizable.

3. *Potassa* and *carbonate of soda* throw down from solutions of salts of brucia a white precipitate of brucia, which is insoluble in an excess of the precipitant. Viewed under the microscope, immediately after precipitation, it appears to consist of very minute grains; but upon further inspection, these grains are seen—with absorption of water—to suddenly form into needles, which latter subsequently arrange themselves without exception



into concentric groups. These successive changes of the precipitate may be traced distinctly even with the naked eye.

4. *Ammonia* produces in solutions of salts of brucia a whitish precipitate, which appears at first like a number of minute drops of oil, but changes subsequently—with absorption of water—to small needles. The precipitate redissolves, immediately after separation, very readily in an excess of the precipitant; but after a very short time—or, in dilute solutions, after a more considerable lapse of time—the brucia, combined with crystallization water, crystallizes from the ammoniacal fluid in small concentrically grouped needles, which addition of ammonia fails to redissolve.

5. *Bicarbonate of Soda* produces in neutral solutions of salts of brucia a precipitate of brucia, combined with crystallization water; this precipitate separates after the lapse of a short time, in form of concentrically aggregated needles of silky lustre, which are insoluble in an excess of the precipitant, but dissolve in free carbonic acid (compare strychnia.) Bicarbonate of soda fails to precipitate acid solutions of salts of brucia; and it is only after the lapse of a considerable time, and with the escape of the carbonic acid, that the alkaloid separates from the fluid in regular and comparatively large crystals.

6. *Concentrated nitric acid* dissolves brucia and its salts to intensely red fluids, which subsequently acquire a yellowish-red tint, and turn yellow upon application of heat. Upon addition of protochloride of tin or sulphide of ammonium to the heated fluid, no matter whether concentrated or after dilution with water, the faint yellow color changes to a most intense violet.

7. If a little brucia is treated with from four to six drops of pure *concentrated sulphuric acid*, a solution of a faint rose color is obtained, which afterwards turns yellow. If from eight to twenty drops of sulphuric acid mixed with some *nitric acid* (p. 394) are added, the fluid transiently acquires a red, afterwards a yellow color. Addition of binoxide of manganese transiently imparts a red, then a gamboge tint to the fluid. If the fluid is then, with proper cooling, diluted with four parts of water, *ammonia* added to nearly neutral reaction, or even to alkaline reaction, the solution acquires a gold-yellow color, (J. Erdmann.)

8. Addition of *chlorine water* to the solution of a salt of brucia imparts to the fluid a fine bright red tint; if ammonia is then added, the red color changes to yellowish-brown.

9. *Sulphocyanide of potassium* produces in concentrated solutions of salts of brucia immediately, in dilute solutions after some time, a granular crystalline precipitate, which, when viewed under the microscope, appears composed of various aggregated polyhedral crystalline grains. Friction applied to the sides of the vessel promotes the separation of the precipitate.

10. *Chloride of mercury* also produces a white granular precipitate, which, when viewed under the microscope, appears composed of small roundish crystalline grains.

c. VERATRIA, or VERATRINE ( $C_{64} H_{32} N_2 O_{16}$ )  $Ve^+$ .

1. Veratria appears in the form of small prismatic crystals, which acquire a porcelain-like look in the air, or as a white or yellowish-white powder of acrid and burning, but not bitter taste; it is exceedingly poisonous. Veratria acts with great energy upon the membranes of the nose; even the most minute quantity of the powder excites the most violent sneezing. It is insoluble in water; in alcohol it dissolves readily, but more sparingly in ether. At  $239^\circ$  Fah. it fuses like wax, and solidifies upon cooling to a transparent yellow mass.

2. Veratria neutralizes acids completely. Some salts of veratria are crystallizable, others dry up to a gummy mass. They are soluble in water, and have an acrid and burning taste.

3. *Potassa, ammonia*, and the *mono-carbonates of the alkalis* produce in solutions of salts of veratria a flocculent white precipitate, which, viewed under the microscope, immediately after precipitation, does not appear crystalline. After the lapse of a few minutes, however, it alters its appearance, and small scattered clusters of short prismatic crystals are observed, instead of the original coagulated flakes. The precipitate does not redissolve in an excess of potassa or of carbonate of potassa. It is slightly soluble in ammonia in the cold, but the dissolved portion separates again upon application of heat.

4. With *bicarbonate of soda* and *bicarbonate of potassa* the

salts of veratria comport themselves like those of strychnia and brucia. However, the veratria separates readily upon boiling, even from dilute solutions.

5. If veratria is acted upon by *concentrated nitric acid*, it agglutinates into small resinous lumps, which afterwards dissolve slowly in the acid. If the veratria is pure the solution is colorless.

6. If the veratria is treated with *concentrated sulphuric acid*, it also agglutinates at first into small resinous lumps; but these dissolve with great readiness to a faint yellow fluid, the color of which gradually increases in depth and intensity, and changes afterwards to a reddish-yellow, then to an intense blood-red. The color persists two or three hours, then disappears gradually. Addition of sulphuric acid, containing nitric acid, or of binoxide of manganese, causes no great change in color. If the fluid is then diluted with water, and ammonia added until the reaction is nearly neutral, a yellowish solution is obtained, in which ammonia added in excess produces a greenish light-brown precipitate, (J. Erdmann.)

7. *Sulphocyanide of potassium* produces only in concentrated solutions of salts of veratria flocculent-gelatinous precipitates.

8. Addition of *chlorine-water* to the solution of a salt of veratria imparts to the fluid a yellowish tint, which, upon addition of ammonia, changes to a faint brownish color. In concentrated solutions chlorine produces a white precipitate.

9. *Cold concentrated hydrochloric acid* dissolves veratria to a colorless solution, which, on prolonged boiling, assumes a red color that finally becomes very intense and resembles that of permanganate of potassa. The colored liquid remains unaltered for a long time. This reaction is very sensitive. Trapp.\*

#### *Recapitulation and remarks.*

The alkaloids of the third group also are precipitated by many other reagents besides those above mentioned, as, for instance, by tincture of galls, bichloride of platinum, solution of iodine in iodide of potassium, phosphomolybdic acid, &c. But

\* *Polytechnisches Notizblatt*, 1863, 96.

as these reactions are common to all, they are of little importance in an analytical point of view.†

Strychnia may be separated from brucia and veratria by means of absolute alcohol, since it is insoluble in that menstruum, whilst the two latter alkaloids readily dissolve in it. The identity of strychnia is best established by the reaction with sulphuric acid and the above-mentioned oxidizing agents;‡ also by the form of its crystals—when thrown down by alkaloids—viewed under the microscope; and lastly, by the form of the precipitate which sulphocyanide of potassium and chloride of mercury produce in solutions of its salts. Brucia and veratria are not readily separated from one another, but may be detected in presence of each other. The identity of brucia is best established by the reactions with nitric acid and protochloride of tin or sulphide of ammonium, or by the form of the crystalline precipitate which ammonia produces in solutions of salts of brucia. Veratria is sufficiently distinguished from brucia and the other alkaloids which we have treated of, by its characteristic deportment at gentle heat, and also by the form of the precipitate which alkalies produce in solutions of its salts. To distinguish veratria in presence of brucia, the reaction with concentrated sulphuric acid is selected.

To these alkaloids I will add *salicine*, though this substance does not properly belong to the same class of chemical compounds.

† If the precipitate produced in the solution of a salt of strychnia by iodide of potassium containing iodine, is dissolved in spirit of wine mixed with some sulphuric acid and the solution is evaporated, strongly polarizing prismatic crystals of sulphate of iodide of strychnia are obtained. De Vrij and Van der Burg (*Jahresber v. Liebig, and Kopp, 1857, 602.*) Whether this reaction is characteristic for strychnia, can be known only after the optical properties of analogous compounds of the other alkaloids shall have been studied.

‡ The only substance which shows somewhat analogous reactions in this respect, is aniline. A. Guy has, however, called attention to the fact that aniline, treated with sulphuric acid and oxidizing agents, acquires a pale green color at first, which gradually deepens, and only then changes to a magnificent blue, which, after persisting some time, turns finally black.

## NOTES ON PLASMA.

### SALICINE ( $C_{26}H_{18}O_{14}$ .)

1. Salicine appears either in the form of white crystalline needles and scales of silky lustre, or, where the crystals are very small, as a powder of silky lustre. It has a bitter taste, is readily soluble in water and in alcohol, but insoluble in ether.

2. No reagent precipitates salicine as such.

3. If salicine is treated with *concentrated sulphuric acid*, it agglutinates into a resinous lump, and acquires an intensely blood-red color, without dissolving in the acid; the color of the sulphuric acid is at first unaltered.

4. If an aqueous solution of salicine is mixed with *hydrochloric acid* or *dilute sulphuric acid*, and the mixture boiled for a short time, the fluid suddenly becomes turbid, and deposits a fine granular crystalline precipitate (saliretine.)

(To be Continued.)

## NOTES ON PLASMA.\*

By MR. G. F. SCHACHT.

Early in the year 1858 a paper of mine was read before the Pharmaceutical Society, entitled "*Glycerine, a Proposed Substitute for Oils and Fats in Ointments.*"

The discussion which followed the reading of this paper (supposing the report of the *Journal* to have been correct) appeared to me at the time, as it appears to me now, by no means characterized by judgment or candor. It seemed to be assumed that the proposed substitute "plasma," was identical with a certain something else that had been tried and found wanting, and that therefore there was little hope for plasma. The two things, however, were not alike. Unfortunately, I was unable to be present on the occasion, and, as no defence for the proposition was volunteered by any other person, a verdict, on the whole adverse, was delivered by the learned critics. Notwithstanding this damaging circumstance, certain individuals, both in my own neighborhood and in other localities, were differently impressed, and, having given the preparation something of a trial, arrived at the conclusion to continue its use. And so, after eight years'

\* Read before the Pharmaceutical Conference, Nottingham meeting.



experience, I am not a little pleased to find plasma not only talked about, written about, and prescribed, but also that a proposition has been made by no less an authority than Dr. Redwood to introduce it into the next Pharmacopœia.

From the date of my paper (February, 1858) to the present moment I have made no further public allusion to the article; I may, perhaps, then be excused if I now once more obtrude it upon my fellow-pharmacæutists.

It is, perhaps, undesirable that I should follow every one who has expressed himself upon the matter; in referring, however, to the opinions and observations of a few, I trust to be understood to imply no disrespect for the labors of the rest.

I may, observe, as a general remark, that those who have written upon the matter express opinions favorable to the preparation; the objections to it have usually been uttered in conversations and discussions upon these more deliberately expressed opinions. The list of tangible objections, however, is not large; it amounts to no more than two. These are serious objections, I admit, if they really exist, but they are not numerous.

The first is, that the preparation becomes softer by exposure to the moisture of the air; and the second, that it is liable to become mouldy by keeping.

With regard to the first, I think we must admit that it is a difficulty. I pointed it out in my original paper, and I do not think there is any prospect of our being able altogether to obviate it. We must accept it as a property of all preparations of glycerine, and avoid exposure to moisture as much as possible. But I have not found this property of much practical inconvenience. I have kept plasma in a common covered pot for a long time without apparent change. Here is a sample kept in this way since December, 1865, and it is still of very good consistence. But if the article be really useful, there would be no more difficulty in preserving it in well-closed vessels than many others about which we have to be specially careful.

The second alledged objection to plasma is, that it becomes mouldy by keeping. This statement is backed by the authority of names that command respect. Mr. Dean and Mr. Squire

have both recorded this fact against plasma, and it is difficult to discredit anything advanced by observers of so large experience and of such well known carefulness. But without intending any contradiction of the observations of others, I am bound to assert that I never saw a particle of mould upon plasma, and that since 1858 I have never been more than a few days at a time without plasma in stock. It is possible the mould to which these gentlemen refer may have appeared upon some of the compound plasmas. I admit I have not kept many of these for any length of time, but such as I have kept—*Plasma linci* and *Plasma petrolei*—have remained as free from mould as simple plasma itself. I do not therefore feel disposed, as yet, to admit “a disposition to become mouldy by keeping” as a proved fact against plasma; but, on the other hand, am bold to assert that it has the but one weak point already admitted.

Though I have prepared plasma in batches varying from one ounce to twenty pounds, and have for experimental purposes occasionally modified my formula, I have found no advantage to result from any change, either in the proportions of the ingredients or in the selection of any particular starch granule. Some experimentalists have supposed considerable differences in the results to have attended the employment of different feculas. My own experience goes rather to constrain me to attribute all variations of result to slightly altered manipulation. For instance, if, after heating the mixed ingredients to the required temperature and for the required time, the vessel be removed from the fire and its contents allowed to cool without further stirring, they will become gelatinous and toughly elastic, a consistence very inconvenient for the required purpose, but by a little judicious stirring during the process of cooling this may be entirely obviated, and an excellent ointment-like consistence obtained. Again, I have observed the translucency of the result to depend a good deal upon the time the mixture is exposed to heat, and the amount of stirring during the last part of the process. I find arrowroot, *tous-les-mois*, and potato starch will all give equally good results under exactly similar circumstances; and, on the other hand, they all, under slightly modified circumstances, will yield inferior results.

My experience, therefore, leads me to suggest but little change in my original instructions, which were as simple as could well be—viz. : —“Take of starch-powder 70 grs., glycerine 1 fl. oz.; mix the ingredients cold, and heat to 240°, constantly stirring.” All I would add to that is, if the batch be large, say 10 lb. or 20 lb., it is better to escape the dreary task of constantly stirring so large a mass, whilst it is being gradually heated to 240° (which must be done if the starch be added.) This can be accomplished by mixing the starch with about one-twelfth of the glycerine, placing the remainder on the fire, and, when this has become heated to 260°, (which will involve no special attention), mixing all together and stirring till complete. I venture then to repeat my opinion that plasma, carefully made, is a very elegant and useful material, possessing features of undoubted advantage over the fats commonly employed for ointments, and is not liable to any serious inconveniences.

I wish now more particularly to refer to some of Dr. Redwood's remarks contained in his paper, “*On the Construction of a Pharmacopæia*,” (April 5, 1865), and more especially to the nomenclature by which he proposes to designate this solid preparation of mine and certain other classes of fluid compounds of glycerine. He introduces the matter by a kindly and favorable mention of plasma. He says (vol. vi., 2d series, p. 572:—

In external applications, also, some improvement has been made. The old form of ointment has often been referred to as one calling for improvement, for what can be more offensive than a rancid unguent smeared over the skin? The so-called ‘plasma,’ which was introduced by Mr. Schacht, of Clifton, in 1858, is certainly a great improvement in elegance and the absence of repulsiveness upon the forms previously used for similar purposes. This plasma, which is a solution of starch in glycerine, has now been in use for several years, and there appears to be but one objection to it, which is that, if exposed to the air, it absorbs moisture, and is then liable to become mouldy. But it has several recommendations, and it will probably

come into more general use as it becomes more extensively known."

He then alludes to a class of preparations in which glycerine acts as a useful solvent, and in which the resulting compounds still retain the fluid form of the solvent. After commending these also as a useful series of applications, he proceeds to criticise the names by which they have hitherto been called. He says:—

"If glycerine is to be thus used, it is desirable that we should have some name that could be conveniently applied in pharmacy as a generic name for solutions where it is employed as the solvent. Some names have been already proposed, but none of them appear to me unobjectionable. Solutions in glycerine have sometimes been called glyceroles, but this name is suggestive of a property the reverse of that which glycerine imparts. Glyceroleum cannot, therefore, be considered a suitable generic name for a class of preparations distinguished from olea and unguenta by the possession of entirely different characters. Then we cannot call them glycerides or glycerates, because these names are already appropriated as chemical names, having different significations from those here intended. I would suggest that the name glycemate might be suitably used for these preparations. This name has not yet been appropriated that I am aware of, and it seems to fulfil what is required. The word glycemate would be glycematum in Latin, and this would apply to solutions of substances such as I have named in glycerine. The solution of starch in glycerine, Mr. Schacht's Plasma, would be Glycematum Amyli, glycemate of starch. Under this name it would be included among other solutions in glycerine; but as this glycemate of starch may itself become the basis of a class of external applications, while others of the glycemates are applicable for different purposes, it would be desirable to have a name that could be used as a generic name for preparations of glycemate of starch with more active ingredients. Thus the glycemate of starch forms a good vehicle for the application of aconitia, atropia, &c., and what name should be applied to such? I would suggest that the name Glycematum Amyli should be abbreviated into Glycemylum, which would be a synonym for

glycemate of starch, and a generic name for preparations consisting of what is now called plasma, with the addition of other substances.

We should thus have—

*Glycematum Amyli*, Glycemate of Starch. Synonyms: *Glycemylum*, glycemyle, Plasma. Solution of starch in glycerine.

*Glycematum Aloës*, Glycemate of Aloes. Synonym: Glycerole of Aloes. Solution of Aloes in glycerine.

*Glycematum Boracis*, Glycemate of Borax. Solution of borax in glycerine.

*Glycematum Carbolicum*, Carbolic glycemate. Solution of carbolic acid in glycerine.

*Glycematum Gallicum*, Gallic glycemate. Solution of gallic acid in glycerine.

*Glycematum Tannicum*, Tannic glycemate. Solution of tannic acid in glycerine.

And then we might have—

*Glycemylum*, Glycemyle. Synonym: Plasma. Solution of starch in glycerine.

*Glycemylum Aconitiæ*, Glycemyle of Aconitia. Solution of aconitia in glycemyle.

*Glycemylum Atropiæ*, Glycemyle of Atropia. Solution of Atropia in Glycemyle, &c.

Now, I think the author's strictures upon the names glycerole, glyceride and glycerate are perfectly fair, and I agree with him in thinking they ought not to be used, but I cannot see that the new ones he suggests are one whit better. In the first place, the words *glycematum* and *glycemylum* are very much like each other, the difference not only being slight, but being also one that would by no means easily fix itself in the memory of the prescriber and dispenser. Here are two distinct forms of remedy as different in physical features as an "extract" differs from a "liquor" or an "aqua." Why, then, call them by names which sound and look so much alike? I admit that *glycemylum* suggests itself as a compound word of *glycerinum* and *amylum*, but then that does not necessarily imply that *glycemylum* is solid, for unless heated the ingredients would



remain fluid. But I do not at all see the etymological appropriateness of *glycematum*. A *glycemate* might certainly be a correct name for a compound of glycerine acid (did such a thing exist) and a base; but, as this is not intended, I can only suppose the word to be also a compound of *glycerinum* and *pomatum*. But that would rather suggest a solid, inasmuch as *pomatums* usually are solid. But Dr. Redwood applied this term to the fluid class of preparations.

I cannot help thinking that the Doctor has passed over the most simple, the most natural, and the most correct name for these fluid glycerines. When we dissolve small portions of foreign substances in water, we call the resulting fluids waters, *aqua*. A little oil of cinnamon dissolved in water constitutes cinnamon water, *aqua cinnamomi*. A little lime dissolved in water we call lime water, *aqua calcis*, &c. We do not find it necessary to increase the mystery of the matter by talking of an "aquate of lime," "aquatum calcis," "aquatum cinnamomi;" why not, therefore, call a solution of aloes in glycerine "*aloes glycerine*,"—*Glycerinum Aloës*—or a solution of tannin in glycerine *Glycerinum Tannicum*? Such a nomenclature would be too simple and obvious for confusion, and the whole series of medicated glycerines would lie together with the simple solvent at their head.

And with regard to the solid series—*plasma* and its compounds—I cannot help thinking they had better continue to be called by the name under which they were introduced. As god-father to the interesting stranger, I may perhaps be somewhat partial; but I think the name both euphonious and descriptive: it implies something to be spread; it is not more arbitrary than others we employ with great convenience, such as "*tinctura*" and "*emplastrum*," and it serves to discriminate peremptorily between the solid and the fluid forms of the glycerine applications.

If, then, these preparations are honored with places in the new *Pharmacopœia*, I hope they will appear under the easily-recognized names of "*glycerina*" and "*plasmæ*."—*Lon. Chem. News*, Oct. 5, 1865.

## Varities.

*Heveone*.—M. Mathieu is announced as having discovered a new substance called Heveone, and which promises to become of important use in many of the arts.

It is a viscous vegetable fat obtained by the action of a high temperature upon a pure kind of caoutchouc.

This substance possesses great powers of adhesion to any surface to which it may be applied, and, as it does not oxidize nor alter in the air, it serves admirably to preserve iron or steel instruments and polished articles from rust or tarnish. It retains this property even when the coating is so thin as to be almost imperceptible.

Applied to stopcocks, pistons, screw connections and the like, it renders them at once beautifully mobile and perfectly tight; it does not dry or become sticky, nor does it attack brass or other metal work, as the generality of greases do.

Being quite impervious to water, heveone applied to articles made of leather, such as boots, harness, etc., after a few applications, renders them water-proof and supple; it also tends to preserve objects from decay. It is considered the best material to use for rifles, whether as a constituent of the greased wood, or to protect the interior of the barrel from rust; it is found to prevent fouling to a far greater extent than any other kind of grease, and renders the subsequent cleaning a matter of no difficulty.—*Friend's Review*.

*Effects of the Bite of the Scolopendra heros (Centipede)*.—Communicated by H. C. Wood, Jr., M. D., Prof. of Botany in the University of Pennsylvania.

*Dear Doctor*:—I have recently received an account from a correspondent in Texas, Dr. G. Linceicum, of the effects of the bite of the centipede, which seems to me worthy of publication, as I have never met with a similar account before.

The species is the *Scolopendra heros*, Girard, which not unfrequently attains the length of eight inches, and a breadth of nearly an inch. Dr. Linceicum is too well known to lovers of natural science to necessitate my saying anything about his reliability; the language is his own.

"You wish me to give you as full an account of the symptoms following the bite of the centipede as I can, and ask me if I ever saw a case. Yes.

In the year 1850 I was called to a case six miles off, and when I arrived the little girl was dead. She had survived the bite five or six hours. The whole surface was dappled over with livid spots from the size of a dollar down to a five cent piece, and there was an elastic puffiness, giving the whole person an enlarged or fat appearance. She had been dead but

a few minutes when I arrived, and felt so soft and life-like, that I examined her very carefully, hoping I might find some indications that would encourage me to experiment a little, but the child was dead. The case occurred in this wise: the mother, Mrs. K., was combing her hair, and dropping her comb it fell through a crack in the floor near the wall. The little girl, who was about four years old, went immediately out to search for the comb, and running her hand through the fence rail underpinning, the centipede, which had been attracted by the comb, and had not time to get away, saw her little white fingers approaching the place where the comb had fallen, turned and made another plunge (for he is a beast of prey), and striking the child's thumb near the outer joint, ran up towards the hand, leaving a track on the thumb very similar to what a sharp, small spur would make were it rolled along on the skin. There were five little rosy holes made with the feet, and higher up on the thumb the grab of the caliper-like mandibles was plainly seen. The symptoms were, according to the mother's account, instant complaint, which grew rapidly worse, which was described by the child as being all over her. Vomiting of a pale yellow glairy matter supervened, which continued at short intervals with increasing violence, until the child, in a convulsive struggle, ceased to breathe.

Five other cases of centipede bites have occurred in this vicinity, none of whom died. The symptoms were the same as those described in the Keene child till the vomiting ensued; at this stage of its action the pain and suffering were checked in four of the cases; in the fifth case it was checked before it had run so far. The same remedies that will cure the bite of the rattlesnake seem to do no good in cases of centipede bite. From the Mexican Indians we have obtained the antidote, and it was that which was so successfully applied in the five cases named above. When properly prepared and administered, it entirely relieves the patient of all symptoms of poison in about four hours.

I did not see these cases myself, but they occurred close by, and I have no doubt as to their being correctly reported to me; two of them having occurred in the practice of my son Lucullus, who is a physician. The antidote is the roots of the *Tephrosia Virginia*, boiled in milk (sweet milk) and taken in doses of half a teacupful, and repeated at intervals of fifteen or twenty minutes. A good handful of the root, as long as the hand is wide, pretty well bruised, and boiled in a quart or three pints of sweet milk, is about the average preparation; but when the bite is a bad one, has been done an hour or two, and the patient is of a robust constitution, the preparation should be liberal. Though the *tephrosia* is a powerful agent, and, if carried too far beyond the antagonistic action of the poison, is, I presume, not entirely without danger, I have never known any bad symptoms to arise from its use.

The scorpion is of no consequence at all. I said all that is necessary about him in my last letter to you. He travels over all parts of our

houses, frequently dropping down upon us from the ceiling, and stinging us in bed. It frightens the women and children, but in all my long life, it has never happened in the circle of my knowledge, that any serious injury resulted from the sting of the scorpion, and the scorpion I speak of now is the true one."—*Am. Journ. Med. Sci.*, Oct., 1866.

*Formula for Collodion.*—Dr. J. P. Maynard, who originally introduced this article to the profession, gives (*Boston Med. & Surg. Journ.*, Aug. 9, 1866) the following formula for its preparation best adapted for surgical purposes:—

"Take two parts of sulph. acid, sp. gr. 1.850, and one part nitric acid, sp. gr. 1.450. Mix them—allow the temperature to fall to about 100° Fahrenheit. Add to this, raw cotton, to point of saturation. Let it soak about one to two hours. Pour off the acids. Wash the cotton till litmus paper shows all acidity removed. Dry thoroughly. The cotton will now be found to be converted into a gum, completely soluble in ether of about .750 sp. gr., or in pure ether 3 parts and alcohol 95 per cent. 1 part. About 2 ounces of cotton thus prepared will make about 1 pint of collodion of proper consistency for surgical purposes. For photographic objects, a less amount will be sufficient. The conditions for success by this formula are simply precision in the details and careful manipulation, which a little experience will perfect."—*Am. Journ. Med. Sci.*, Oct., 1866.

*Discovery of a Mammoth.*—At a late sitting of the Academy of Sciences a letter was received from M. de Baer, of St. Petersburg, announcing that a mammoth, still covered with its skin and hair, had been discovered in the frozen soil of Arctic Siberia. This discovery had been made in 1864 by a Samoyede in the environs of Taz Bay, the eastern branch of the Gulf of Obi. The news only reached St. Petersburg towards the end of 1865; but as the bodies of large animals will keep a long while in those regions, if they are not completely uncovered, and as this mammoth was still inclosed in the frozen soil, the Academy of St. Petersburg has, with the aid of the Russian Government, sent M. Schmidt, a distinguished palæontologist, to examine the animal and its position in the locality. It is hoped M. Schmidt will arrive before the decomposition is too far advanced, and that a correct notion may be obtained of the outer appearance of the animal, and also, from the contents of the stomach, of its natural food. The pre-historical figure of the mammoth drawn on a piece of ivory, found in a cavern of Périgord by M. Lartet, will then admit of verification.—*Med. News*, Aug., 1866, from *Med. Times and Gaz.*, April 28, 1866.

*The Great Prize in Electricity.*—The French Government has issued an invitation to the savants of all nations to compete for the prize of 50,000 frs. which will be decreed five years hence to the author who shall have discovered the means of rendering Volta's pile economically applicable to

manufactures as a source of heat, to illumination, to chemistry, mechanics, or practical medicine, The *concours* will remain open for five years, dating from April 18, 1866.—*Med. News, Aug., 1866, from Med. Times and Gaz.*

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*Prepared Liquid Glue.*—Take of best white glue sixteen ounces ; white lead, dry, four ounces : rain water, two pints ; alcohol, four ounces. With constant stirring dissolve the glue and lead in the water by means of a water-bath. Add the alcohol, and continue the heat for a few minutes. Lastly pour into bottles while it is still hot.—*Drug. Cir., Oct., 1866.*

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*Marine Glue.*—Dissolve three parts of India rubber in thirty-four parts of coal-tar naphtha—aiding the solution with heat and agitation ; add to it sixty-four parts of powdered shellac, which must be heated in the mixture, till the whole is dissolved. While the mixture is hot it is poured upon metal plates in sheets like leather. When required for use, it is heated in a pot, till soft, and then applied with a brush to the surfaces to be joined. Two pieces of wood joined with this glue can scarcely be sundered.—*Drug. Cir., Oct., 1866.*

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*Preservation of Wood against Decay.*—A correspondent furnishes us an interesting article on the above subject, which want of space this week obliges us to condense. We merely give the important parts. After speaking of the advantages of charring wooden posts before setting, he says :—Scientific men have explained this superiority to reside in the peculiarity of charcoal for absorbing the gases arising from decaying substances. But charcoal retains this property but a short time unless kept from the air. The reason of this lies in its limited absorbing power. In less than twenty-four hours after being set, the charcoal becomes saturated, and is then entirely ineffective for protecting the wood. The cause of the preservative influence must then be sought elsewhere, and the following is my belief :—The microscope reveals the cause of decay as due to parasites feeding on albuminous substances. Dr. Schmoele gives the following conditions, all of which must be fulfilled before decay takes place : The presence of parasites or germs, albuminoids, moisture, free oxygen, together with a suitable temperature, and the absence of greater counter-acting influences. Now, charring wood dispenses with the two first conditions, for the heat required to char the outside coating is more than sufficient for decomposing the albuminous substances, and destroying all parasitic germs. A temperature but little above the boiling point would answer for this equally well. I come then to the conclusion that, for preserving wood, charring is quite superfluous, a much less heat answering equally well. On this idea, original I believe with myself, and which I claim as my invention, I base my plan for the preservation of wood. I propose to store the timber, of whatever description, in large stone or iron



boxes or rooms, through which I circulate currents of hot air or super-heated steam, till each piece is heated to the required degree.

This process offers the following advantages: Greater simplicity, greater cheapness, requiring no expensive chemicals, greater expedition of the work.

As is well known, the albuminoids are highly hygroscopic, and in consequence expand or contract with every change of moisture in the air. Wood treated as above is no longer subject to such changes.—*Drug. Cir.*, Oct., 1866, from *Scien. American*.

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*Introduction of Shad in Southern Rivers.*—Dr. W. C. Daniell, writing from Savannah to the editor of the *Southern Medical and Surgical Journal*, says:

"I am gratified to say that I have fully established the White Shad in the Alabama River, where they are as large and as fine as our own shad.

"Now that it has become a fixed fact that shad prosper at the mouth of the Alabama River, we may readily infer that they will equally prosper at the mouth of the Mississippi River, and probably of all the rivers discharging into the Gulf of Mexico. I hope to test this in another year. I would have done so this spring, but that my fishermen disappointed me. As soon as I was satisfied that there were distinctive, though minute, differences between the shad of Savannah and the Ogeechee Rivers, I felt confident of establishing the White Shad in the Alabama River. These differences were pointed out by our fishermen in 1846, and 1848 I planted the fecundated eggs in a small tributary of the Etowah, and in 1851 or '52 the fish were taken in the traps at Wetumpka and Tuscaloosa."—*Drug. Circ.*, Oct., 1866.

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*A Powerful Microscope.*—The most powerful microscope ever constructed has been made by Messrs. Powell & Leland, and described in a paper read before the Royal Society of London, England. The power of this instrument is fully double any which had ever been constructed previously, and altogether supersedes what had before been considered the utmost attainable limit of perfection in this instrument. This powerful microscope magnifies 3,000 diameters with its lowest eye-piece, and 15,000 diameters with its piece of the highest power—the latter being equivalent to magnifying no less than 1,575,000,000, or making an object appear that number of times larger than it really is! How immensely must such an instrument increase our knowledge of the lower organisms; may it not even enable us, eventually, to determine the ultimate constitution of matter; it must at least greatly aid the scientist in his researches in that direction.—*Drug. Circ.*, Oct., 1866.

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*The Virtues of Borax.*—The excellent washerwomen of Holland and Belgium, who "get up" their linen so beautifully white, use refined borax

as a washing-powder, instead of soda, in the proportion of one large handful of powder to about ten gallons of boiling water. They save in soap nearly one-half. All the large washing establishments adopt the same mode. For laces, cambrics, etc., an extra quantity of the powder is used; for crinolines, requiring to be made stiff, a strong solution is necessary. Borax being a neutral salt, does not in the slightest degree injure the texture of the linen. Its effect is to soften the hardest water, and therefore it should be kept on every toilet table. To the taste it is rather sweet; it is used for cleaning the hair, is an excellent dentifrice, and in hot countries it is used, in combination with tartaric acid and bi-carbonate of soda, as a cooling beverage. Good tea cannot be made with hard water. All water may be made soft by adding a teaspoonful of borax powder to an ordinary-sized kettle of water, in which it should boil. The saving in the quantity of tea used will be at least one-fifth.—*Med. & Surg. Rep.*, Sept. 29, 1866, from *Druggists' Circular*.

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*Agates.*—The Reese River (California) *Reveille* says, that about three miles north of Ione there is an isolated mountain, some five hundred feet high, which is called Agate mountain. Its entire surface upon all sides from summit to base, is covered with agates and concretions, and on digging into the soil they are found like potatoes in a hill. The agates are usually oval and sometimes globular in form, and varying from one to four inches in diameter, and are beautifully banded and striped. In the hands of a skilful lapidary they could be fashioned into pleasing ornaments. The various concretions are found in great abundance, and many of them are particularly beautiful. In their sphericity they are sometimes found as perfect as a ball, though generally the spherical shape is quite distorted. They are hollow, and usually filled with crystals. On breaking them open their interior is often found to be irregularly hollow and lined around with a layer of quartz crystals, forming what is termed a geode—a "little crystal grotto." Some of these hollow concretions contain a smaller concretion inside, which rattles when shaken in the hand.—*Drug. Circ.*, Aug., 1866.

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*Honey and Bees in California.*—Many citizens have engaged extensively in keeping bees, and it is found that they multiply and thrive in the most satisfactory manner. A good hive will produce two hundred pounds of honey, or may be made to produce twenty new swarms in a single season. Mr. Hamilton, of Stockton, reports that from thirty-five hives with which he began in February, 1860, he had five hundred hives and twenty thousand and seventy-five pounds of honey on the first of October of the same year. The bee is dormant in California only two or three months, and they find abundant food even in the driest time.—*Drug. Circ.*, Aug., 1866.

*Nitroleum, the New Substitute for Gunpowder.*—A highly interesting official report has just been made by Colonel Shaffner of a series of experiments conducted by him at Washington for demonstrating the use of nitroleum (which it should be explained is the new and far preferable name by which the Colonel designates the compound which has hitherto been called nitro-glycerine) in the explosion of mines. The results fully confirm the fact that the explosive qualities of nitroleum are far in advance of gunpowder. Two similar cast-iron pieces, weighing each 300 lbs., had a hole one inch diameter and fifteen inches deep bored in them, and were charged one with powder and the other with "nitroleum." The powder discharged through the fuse-vent three-sixteenths inch diameter did no injury. The nitroleum tore the iron to pieces, the force extending downward from the bottom of the charge, leaving a cone with its apex at the bottom of the drill-hole. Four musket-barrels were placed in wrought iron cylinders, two filled with gunpowder and two filled one-third full with nitroleum. The musket barrels charged with powder were exploded by electricity; they burst open, tearing the iron to pieces. The explosion of the barrels charged with nitroleum produced a very different effect; they were flattened, and not so much broken to pieces; the force was so sudden and great that after the barrel had irregularly broken up and down the iron appeared like rolled plate—even and polished. The experiments appear to demonstrate that nitroleum can, with ordinary precautions, be handled and employed without greater danger than is common to gunpowder, and for blasting operations, at least, it presents undoubted advantages.—*Chem. News, Aug. 17, 1866, from Amer. Artisan.*

*Refracting Powers of Saline Solutions.*—Physical processes may in certain cases be advantageously employed to determine the chemical constitution of bodies. Density, boiling point, dilatation by heat, and even the capillarity of liquids, have been suggested as giving useful results. One of the last numbers of Poggendorff's *Annalen* contains a memoir by M. E. Reichert, on the different refracting powers by fluids modified by their chemical composition. This memoir contains the results of experiments on solutions of common salt of different strengths. The proportions of salt shown by optical means and by ordinary analysis agree very closely. The first column of the following table the proportions obtained by analysis, and the second the results of the optical method:—

2-26	2-27
7-12	7-13
12-02	12-07
17-25	17-25
23-02	22-89

An equally satisfactory result was obtained with solutions of sugar: but with alcohol and acetic acid the differences in the refractive indices are only half as great, and the indications, consequently, are not so satisfactory.—*Chem. News, Sept. 28th, 1866, from Les Mondes.*

*The Hardness of Silver.*—Goldsmiths often complain of the hardness of silver, which is sometimes very difficult to carve, and presents a dead grey cut. These properties are generally attributed to the presence of a foreign metal: but M. Mathey, assayer at Locla, has shown that in this silver there is neither tin, lead, nor any other injurious metal. He considers this property to be due solely to the high temperature at which silver is cast. By letting the crucible cool till a slight solid crust is formed on the surface of the fused metal, and casting at this moment, a soft silver with a brilliant cut is obtained.—*Chem. News*, Sept. 1866, from *Dingler's Polytechn. Journal*.

*Rheadine.*—Hesse, looking for morphia, has discovered a new alkaloid in the red poppy; it is also to be found, he says, in good opium. It is soluble in water, alcohol, and ether, crystallizing from the last in white prisms. Ammonia precipitates it in white crystalline flocculi, bichloride of mercury gives a white amorphous precipitate, chloride of gold a yellow precipitate. Strong acids decompose it in the cold, giving a purple solution. The author promises to publish his method of extracting *Rheadine*.—*Chemical News*. Aug. 17, 1866.

### Abstract of the Minutes of the Philadelphia College of Pharmacy.

A stated semi-annual meeting of the Philadelphia College of Pharmacy was held at the College hall, on Monday evening, September 24th, 1866.

Nineteen members present.

In the absence of the President the 1st Vice President, Samuel F. Troth, presided.

The Minutes of the last meeting were read and adopted.

The Minutes of the Board of Trustees were read by the Secretary of the Board. By the minutes of the Board the College is informed that John M. Maisch was duly elected to the chair of Pharmacy in the school of the College, made vacant by the resignation of Prof. Procter.

The Minutes of the Board also inform that the charge for Lecture tickets has been increased from \$8 to \$10.

Henry Cramer having been recommended by the Board of Trustees for resident membership, an election was ordered,—Wm. J. Jenks, acting as teller reported Mr. Cramer duly elected.

The delegates to the meeting of the American Pharmaceutical Association, lately held at Detroit, reported, through Prof. Edward Parrish, their attention to that duty.

The semi-annual election for eight trustees being ordered, Wm. C. Bakes and Wm. Evans, Jr., acting as tellers, reported the election of the following members as

*Trustees,*

Dr. Wilson H. Pile,  
 Alfred B. Taylor,  
 Wm. C. Bakes,  
 Henry N. Rittenhouse,

Edward Parrish,  
 Evan T. Ellis,  
 Wm. J. Jenks,  
 Chas. Shivers.

*Committee on Deceased Members,*

Edward Parrish, Wm. Procter, Jr., Charles Bullock.  
 On motion, then adjourned.

CHARLES BULLOCK, *Secretary.*

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## Editorial Department.

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### BRITISH PHARMACEUTICAL CONFERENCE AND EXHIBITION AT NOTTINGHAM.

—This body met on the 21st of August, as announced, and the meeting appears to have been very satisfactory to those who participated in its movements. The meeting convened in the Assembly Rooms, Nottingham, at 10 o'clock, A. M. After the election of seventy-seven new members, the Report of the Executive Committee was read, from which we learn that three members of the Conference died during the year; that the number of members of the Conference is nearly 400; that, in the opinion of the Committee, an excellent influence both local and general, is being exerted by the Conference; and that as a Body it may now be looked upon as fairly established. The exhibition accompanying the present meeting, is alluded to as tending to the advancement of Pharmacy, and worthy of continuance as an annual feature. The Treasurer's report was then read and disposed of, when the President, Prof. Bentley, delivered the annual address. The study of Botany in connection with Pharmacy was the theme chosen, without any reference to the policy of the Conference, or the transactions in the interim, as is usual in our Association. Very good arguments are adduced why pharmacutists should be acquainted with botany, and as a paper it reads well and contains many valuable hints. The reading of the regular papers then commenced, and seven were disposed of at the first sitting, several of which have been reprinted in this number.

The second sitting, which commenced at 10½ o'clock, A. M., on Wednesday, was occupied by Mr. Joseph Ince, of London, in reading an admirable paper on Pharmaceutical Ethics, which he discusses under the following heads:—"Ethics of the Shop," "Social Ethics,"—"The behaviour of the Pharmaceutist with regard to those in the same line of business with himself," "Medical Ethics,"—"The behaviour of the Pharmaceutist with regard to the Medical Profession," "Ethics of Public Life—the behaviour of the Pharmaceutist as a member of his Society," "Personal Ethics—the behaviour of a Pharmaceutist as an individual," and "Ethics



of trade extension," the whole occupying more than thirty pages of this Journal, and too bulky for transfer. The writer is held in good esteem among his fellow members, and is a frequent contributor to the *Pharmaceutical Journal*; his style is peculiar, forcible, often quaint. He is evidently a man who reads much and thinks as he reads. At the risk of displacing other matter, we offer our readers the first section—the *Ethics of the Shop*:—

"Pharmacy is a trade. When a man buys goods at one price to sell them at another, gaining the advantage of the difference in tariff, being further influenced by the known law of supply and demand, he is engaged in trade. When he buys in undivided bulk, to sell again in undivided bulk, he is a merchant, but still engaged in trade. When he purchases in undivided bulk to vend in large though in divided bulk, he is a wholesale tradesman. When he buys articles in a divided bulk, to sell again in small divided bulk, he is a retail tradesman; nor does it make the slightest difference whether he sells hats or Turkey rhubarb, nor whether the seller of the rhubarb be Sir Humphry Davy.

The artist, on the other hand, is a professional man. One painter buys so many feet of canvas, together with so much paint; he places, possibly, upon that canvas something which may not increase its value. A second buys the same amount of canvas, inch by inch, on which he puts the same amount of color, ounce for ounce, and the result may be "The Immaculate Conception."

He places on the canvas that which he cannot buy—God gave it him, and without any phrase of poetry he exercises the gift divine. Neither is the true artist influenced by the necessities of competition, nor by the trade fluctuation arising from supply and demand.

A hundred artists more or less would not alter his position; a hundred paintings on the same subject would not detract from the merit of his own. Its value is intrinsic, and not relative. But the pharmacist buys his stock, whether of drugs, chemicals, or sundries, in order to sell again—he is a tradesman.

But other influences are at work to modify the general fact—the awakening claims of universal education, the long unfaltering teaching of our own Society, the actual pressure from without. Then there is the influence of locality: the West End customer *will* have more than shop dexterity, and in my own neighborhood the mere tradesman would find himself gazzetted.

There is the influence of individual character. The master, fortunately for himself and those around him, has higher than trade instincts, from which circumstance his trade assumes more or less a strictly professional character; but it no more ceases to be a trade than the orchid which counterfeits so strangely shapes of natural beauty ceases to be a plant.

Never forgetting the essentially trade nature which belongs to pharmacy, we at once come to the first ethical rule of the pharmacist, namely, the necessity for the absolutely genuine character of his drugs. No drug or remedy should be admitted into his shop other than that which, in case of dangerous illness, he would not hesitate to supply to the inmates of his own family circle. He cannot be expected to keep the whole range of *Materia Medica*, nor is he to be blamed for applying for eclectic remedies elsewhere. This is an affair of means and circumstances; but in no case should any trade casuistry induce him to lower the standard of excellence of whatever he may possess.

The pharmacist who bears this rigidly in mind will be in no danger of degrading himself by the adoption of low and ruinous prices. Whoever has committed this transparent trade mistake must not afterwards blame the public for exacting the continuance of a state of things to which he has himself voluntarily stooped. On this topic I have great pleasure in giving you the opinion of your excellent treasurer, Mr. Brady:—"The principle which ought to guide the pharmacist in the regulation of his charges is that remunera-

tion should increase in proportion as the class of article makes greater demand on the knowledge obtained by his professional education. If he sells articles dealt in by other classes of tradesmen, he must submit to the same rate of profit. In drugs proper, which require an educated judgment, power of testing and the like, he is entitled to a much higher rate; whilst in all matters of dispensing, his charges should be professional in their character, and not calculated on the cost of employed materials at all. We cannot materially increase the quantity of medicines sold by reducing the price; hence any of us endeavoring by low charges to increase his business must recollect that he does it to the direct injury of the body, in reducing by so much the amount of money that might accrue from its legitimate practice. In large towns the responsibility of prices charged rests with one or two leading men, and if they are true to their professional instincts, the calling can scarcely fail to prosper."

I agree with the above, and I may add that the pharmacist saves himself an immensity of trouble, and will most probably prolong his days, if he will once have the courage to adopt one uniform fixed price, else he is subjected to continual petty annoyance. Having determined to be the master of his own business, he will be content to abide by his own regulations, and not, on the one hand, place himself at the mercy of the competing pharmacist who trims his sail to every wind that blows, or, on the other, to the caprice of the customer, who not always truthfully asserts that he has obtained articles of definite commercial value at a starvation price.

Not only his regard to self-respect, but to his trade interest, will be his guide to a third ethical observance, viz., to supply the public with the precise articles for which they ask. This point strikes me not so much as a question in ethics as in a purely business light; but I have been requested to bring it forward, and I am bound to do so.

The rule of every well-regulated establishment is to supply faithfully and implicitly whatever in the whole range of pharmacy a customer may require—to obtain it if not in stock, whether English or foreign, and to spare no pains that it shall be the identical thing desired.

To do otherwise seems to me not to warrant so fine a phrase as a trade error, but a pure shop mistake. Does the customer want liquor bismuthi, Schacht, he is supplied from Clifton; does he send for Brown's chlorodyne, he receives that made by Mr. Davenport; if quinine be ordered, salicine must not be substituted; and so with the list of similar preparations, whether demanded as a retail order, or as forming an ingredient in a physician's recipe. This course of action is due, not to any particular keen sense of honor, but to trade expediency, precisely as a wise fisherman spreads a well-made net in order that the fish should not slip through. Any house in town or country adopting such a principle must and does gain a reputation which infinitely counterbalances the small extra remuneration to be made out of fictitious articles. Confidence brings trade, and trade puts money in the till—a more practical result than might have been anticipated from the study of pharmaceutical ethics.

This subject may have been proposed in consequence of some of its details not having been clearly grasped. On the one hand, there is a great waste of misapplied ingenuity in the constant attempt to produce colorable imitations of preparations, secret or otherwise, which have gained reputation for some particular chemist. Against this there is no human law; but the moral law, which is the law of God, says such practices are fraudulent, and beneath the dignity of every upright man, and they betray a paucity of inventive power, and it is, moreover, certain that the same skill might find more creditable as well as more remunerative employment.

Still, some pharmacists are in bondage to a groundless fear; they hesitate, under a strained sense of honor, to enter upon what they think pre-occupied, and therefore forbidden ground. "Why," writes Mr. Giles, "should there be any speciality in pharmaceutical production? The same laws will protect an invention in pharmacy as in mechanics, and when the law professes

to deal with the matter, it is a question whether any other protection is needed. You may say ethics shall do what the law does not, and so it should in cases too refined for the law to deal with; but here the law does operate."

From the foregoing it is clear that while no one is justified in the fraudulent imitation of a patent right, either in or out of the pale of pharmacy, yet no pharmacist can claim the exclusive manufacture of any special article in perpetuity, simply because a particular mode of working originally suggested itself to his mind. There is no law in trade or ethics to prevent a man making liquor opii to the best of his ability, any more than in the case of morphia and meconic acid. The most scrupulous and conscientious chemist may get quinine and cinchonine from bark. What casuistry shall assign an arbitrary limit forbidding him to make a liquor? The whole world may make magnesia, light and heavy, calcined or carbonate, although Battley and Howard and Henry have been beforehand in the field. Let not the pharmacist shrink from the lawful use of the experience and labors of the past; which is no reason why he should shrink into a mere copyist, and should not, like Columbus, sail out of the beaten track in search of land not hitherto discovered.

There is a major ethical consideration that can only be treated in a minor key—perfect civility to, and careful attention to the smallest wants of the poorest customer—a civility that should be expressed by words and manner. The ethics of civility to rich customers need scarcely be discussed; in that case, for ethics, read advantage.

Our American brethren have taken the lead in drawing up a regular Code of Ethics. You will find the document in the "Pharmaceutical Journal," Vol. xii. p. 369.

They have also, I think, been most successful in giving directions about the last topic I have to mention in connection with shop ethics—the mutual relation between the master and the assistant.

For general rules I refer you to a paper republished in our Journal, called the "Pharmacist as a Merchant," (vol. vi. p. 655, second series). The idea is admirable, and the literary execution quite equal to the design.

Mr. Frederick Stearns, the author, seems to have steered most successfully between the Scylla of the high and dry, and the Charybdis of the goody-good.

I refer you also to some excellent rules published at the end of Parrish's "Practical Pharmacy;" it contains one difficult proposition, p. 676:—

"Second General Regulation of the Store. During business hours all hands must be on their feet."

Rule XIII. is beyond our present standard. "Every apprentice will be expected to become a graduate of the College of Pharmacy, and will be furnished with tickets of the College, and every opportunity for availing himself of the honor of the degree of that institution." I do not feel called upon to dilate upon this question. There is such a wide difference in individual character, that special rules seem to be impossible. After all, we shall scarcely get further than the inspired direction, "He that ruleth with diligence."\* One point I am compelled to notice, that ethics concern the assistant quite as much as they do the master. I have no intention of adding to the already hard position of the former by harsh remarks, but I say deliberately that neither our current literature, nor the general tone of sentiment expressed in private, bears sufficient trace of the recognition that a code of ethics extends beyond the master. Let the assistant feel that he has a part to play, just

\* It is constantly overlooked that both master and man are overruled by an exacting public, and the public by an equally exacting master—the habits and customs of society.

Young men, while resisting the orders and regulations of their employers, are apt to overlook the circumstance, that the regulations have been deliberately and carefully framed to meet the exigencies of business long before they sold their labor for a salary; hence the antagonism between master and man, and the shipwreck of sound morality.

Young men complain of the little time the business affords for reading: "where there is a will there is a way;" let them employ that little time in reading wholesome standard works of religion, morality, and science, and the standard of ethics would soon be raised above petty considerations arising out of the details of business.—Note contributed by Mr. Deane.

as difficult and just as important as his employer; that on his side he must exercise consideration, and adopt the high tone of feeling which characterizes the English gentleman, and he will do more to render pharmacy endurable, and to promote its social welfare, than whole reams of essays written on the subject. It is painful to recollect that those identical assistants who complain the most bitterly about long hours, close confinement and other ills incident to pharmacy, are sometimes, when once in business on their own account, the very men to perpetuate and extend the evil, and practically, to rivet another link to that chain with which we are darkly bound. Solely for this reason, I have no faith in the efforts that have been made occasionally with regard to early closing. The ethics have been invariably on one side. Once the king of animals was asked his opinion on a work of art. The painting represented a man smiling and self-confident, who, with the most perfect equanimity, was slaying the noble beast.

"Wait till I paint," said the lion.

As matters stand, masters are to shut up, and assistants to improve their minds. I have never seen my way out of this question (nor has any one else); yet I believe that in an establishment where there are two or more assistants, if they would calmly set to work to see how far earlier hours could be adopted without injuring existing business; if, in so doing, they on their part would carefully weigh the master's interest, and be as ethical towards him as they wish him to be towards them; and if, instead of calling him hard names and making excited speeches at a London tavern, they would bear in mind that he is quite as much interested as they; I guarantee that he would be found a willing listener, and there would then be the first and only fair chance of which I know, of both being set at liberty at more rational hours than they are at present.

Before leaving the shop altogether, may I press upon your consideration the desirability of calling it "a pharmacy." The word is English, not fanciful; it is used in the same sense throughout France and Belgium, is highly expressive, and is on all grounds to be recommended."

The remainder of the sitting was occupied with an interesting discussion of topics, embraced in the paper of Mr. Ince.

The third sitting commenced on Thursday, Aug. 23d, and was occupied in reading ten papers on scientific and practical subjects, one of which, on Plasma, is copied into this Journal. Reference was made to a communication from Prof. Parrish, of Philadelphia, to Mr. Dymond, of Birmingham, accompanying certain specimens sent to the exhibition from Pharmacutists in the United States, in which he expresses the hope that the Conference would appoint a delegate to our next Annual Meeting. The President remarked that the Conference was under great obligations to Prof. Parrish, but believed the appointment of a delegate to go so far was attended with difficulties nearly insurmountable, and the matter was left with the Executive Committee to manage, if a way opened.

The fourth and concluding sitting did not occur until Wednesday the 29th; Mr. T. B. Groves in the chair. On this occasion it was resolved that the next Annual Meeting, be held at Dundee, in Scotland. The reception of the Proceedings of the American Pharmaceutical Association, from Prof. Maisch, was acknowledged, and the election of officers for 1866-67, carried out, by which Prof. Bentley, was re-elected President, Messrs. Deane, Hanbury, Stoddart and Ince, as Vice-Presidents, and Dr. Attfield and Mr. Reynolds, Secretaries.

Friday, the 24th, the members visiting Nottingham were invited to a dinner, given in honor of the occasion, by the Nottingham Local Committee, which seems to have been partaken of to satisfaction.

We have not space to give even a condensed sketch of the articles on exhibition, a mere list of which, with short notes, occupies 22 pages of the *Pharmaceutical Journal*. The few articles sent from the United States were received with marked approval, more, however, for the interest exhibited in recognizing the Conference as a body, by sending them so far, than for the extent, variety or rarity of the articles exhibited. We observe the names of Prof. Parrish, Mr. Stearns, of Detroit, Suire & Co., of Cincinnati, William R. Warner & Co., and Mr. Wm. C. Bakes of Philadelphia, as depositors. The report says:—"The Committee desire, with both hands, to shake hands with their esteemed American brethren. They fully appreciate the good feeling evinced towards them, by the collection forwarded across the Atlantic to this the first exhibition of the British Pharmaceutical Conference, nor could it have come under better sanction than the name so well known in practical Pharmacy, as that of Prof. E. Parrish, of Philadelphia." In the line of *Materia Medica* and Chemicals, some very valuable deposits were made, which must have added much to the interest of the exhibition in that direction. We hope to be able to allude to this subject again, and notice some of the items of special interest.

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ST. LOUIS COLLEGE OF PHARMACY.—The following letter to the Editor explains itself:—

ST. LOUIS, Oct., 11, 1866.

*Dear Sir:*—At the annual meeting of the St. Louis College of Pharmacy, held at their hall, Monday, Sep. 24th, 1866, the following gentlemen were elected:—Enno Sander, President; W. H. Crawford, 1st Vice President; E. L. Massot, 2d Vice President; H. Prim, Recording Secretary; E. J. Williamson, Corresponding Secretary; Dr. C. L. Lipps, Treasurer. The College opened its session, with about the same class as last year, on the first of October.

Very respectfully,

E. J. WILLIAMSON,  
Cor. Sec.

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INTERNATIONAL MEDICAL CONGRESS.—The following item, which we take from the "*Medical News*" for August, informs that the medical men of Europe are about getting up an International Medical Congress next year. The pharmacentists have already arranged such a gathering of their body:

The preliminary steps have been taken for the assembling in Paris, at the time of the Universal Exhibition, in 1867, of an International Medical Congress. With this view a central committee has been formed at Paris, who have elected the following officers: *President*, M. Bouillaud; *Vice-*



*Presidents*, MM. Denonvilliers, Gavaret, and Tardieu; *Secretary*, M. Jacoud; *Treasurer*, M. E. Vidal.

This scheme has been sanctioned by the French government, and the Paris committee are preparing the rules and programme of the Congress, which they promise to communicate as soon as determined on. In the meantime we cheerfully comply with the request made to us, to make known the project, and ask the co-operation of the profession in this country.

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**OUR EXCHANGES.**—Our Southern exchanges are slowly coming back again. The Atlanta Medical and Surgical Journal, the Nashville Medical Journal, the Savannah Journal of Medicine, and the New Orleans Medical Record, have been received, and the Richmond Medical Journal comes regularly,

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*Elements of Medical Chemistry.* By B. Howard Rand, M.D., Professor of Chemistry in Jefferson Medical College, Philadelphia. T. Ellwood Zell & Co., 1867: pp. 399, 12mo.

This work has been arranged by the author as a text book for medical students, and he regards it as equivalent to a full set of notes to his course on chemistry in Jefferson Medical College. Aware of the "immense extent of the subjects comprised under the general head of chemistry and physics," he has, by a careful selection, made the effort to embrace so much of the topics in this small volume as shall be most useful to the student in grasping the subject within the limited time he has to devote to it among his numerous studies, expecting the more extended writers to be resorted to when time and opportunity favor it. The term "medical" chemistry is used to convey the idea that in his selections and explanations the author has had in view the uses which the physician makes of chemistry, and has dwelt more pointedly on such portions as bear on his specialities.

The author very properly urges a rigid adherence to the processes of the U. S. Pharmacopœia, and in using officinal titles for preparations, gives those of the Pharmacopœia when included in that work. The universal use of symbols to designate chemical composition, and the necessity of understanding them in order to comprehend the text books and journals, has induced Dr. Rand to give special attention to the elucidation of symbols and nomenclature. The preparation and use of antidotes, and tests for poisons, has received due attention.

The publisher has done his part well, the type being clear and the paper good. Price, \$6.00.

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*Practical Therapeutics*, considered chiefly with reference to articles of the *Materia Medica*. By Edward John Waring, F. R. C. S., F. L. S., Surgeon. From the 2d London edition. Philada.: Lindsay & Blackiston, 1866; pp. 815, octavo.

This handsome volume was received just as we were going to press; notice in our next issue.

## OBITUARY.

HENRY DARWIN ROGERS, one of the most eminent of American geologists, died on the 29th day of May, 1866, at Glasgow, in Scotland. Prof. Rogers was born in Philadelphia in 1809, and at the age of 21 years was elected Professor of Chemistry at Dickinson College, Carlisle, Pa., and afterwards to the Chair of Geology in the Collegiate Department of the University of Pennsylvania. He concluded the geological exploration of New Jersey in 1835, and in 1836 commenced his greatest work,—the exploration of the State of Pennsylvania,—which, after many years of diligent labor, was brought to a close; but the finished report did not appear until 1858, owing partly to want of appropriations for publishing the work, and partly to the great care bestowed on its illustrations, which were completed and published at Edinburgh. In 1857 Prof. Rogers was elected to the Chair of Regius Professor of Geology and Natural History in the University of Glasgow,—an honor rarely, if ever before, bestowed on an American savant.

“His great knowledge on many subjects he was able to impart in a style equally clear and graceful, whether in public speaking or as a writer. Few teachers of science have excelled him in the power of illustrating difficult subjects, or in commanding the attention of large audiences to themes not commonly discussed in public lectures.” He possessed remarkable powers as a conversationalist, which caused him to enjoy a high social position, both in Europe and America, with a numerous body of friends.

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M. DESCHAMPS, well known as an eminent pharmacist, died at Avallon on the 14th day of June, at the age of 62 years. He was a frequent contributor to the pharmaceutical journals, and the author of the process for preserving ointments and cerates by benzoin and poplar buds, now so generally used and approved.

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Prof. JOHN A. PORTER.—John Addison Porter died at New Haven, Conn., on the 25th of August. Prof. Porter was born in Catskill, N. Y., March 15th, 1823, and graduated at Yale College in 1842. Possessed of literary as well as scientific tastes, he was called to fill the post first of tutor, and then of Professor of Rhetoric, in Delaware College, in Newark, N. J., where he resided from 1844 to 1847, when he went to Germany and studied chemistry under Prof. Liebig. Returning in 1850, he first filled the Professorship of Chemistry applied to the Arts in Brown University for two years, when he was called to take the place of Prof. John P. Norton, then recently deceased, as Professor of Analytical and Agricultural Chemistry in Yale College. In 1856 he was transferred to the chair of Organic Chemistry, which position he held until he felt constrained by his declining health to resign it, in 1864.—*Amer. Jour. Science and Arts*, Sept., 1866.

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